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THE KOREAN MILITARY BALANCE:

COMPARATIVE KOREAN FORCES AND THE FORCES OF KEY NEIGHBORING STATES

MAIN REPORT

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The Korean Military Balance

Summary

This report describes the key results of an analysis conducted to assess the overall balance of forces on the Korean Peninsula. Given the complexity of the relations between the ROK and the DPRK, such an assessment of the conventional, asymmetric, and CBRN capabilities on each side is vital to negotiations between states and efforts at arms control. At the same time, there is no one Korean military balance that can be used for policy planning or arms control negotiations until decisions are made about what forces and issues to address.

The tensions between the Koreas—and the potential involvement of the People's Republic of China ("China" or "PRC"), Japan, and the United States of America ("USA" or "US") at both the political and military level—create a virtually open-ended spectrum of possible conflicts. This is particularly true if one considers the number of times that war has grown out of unpredictable incidents and patterns of escalation; the historical reality that the probability of less probable forms of war actually occurring has been consistently higher than what seem to be the most probable contingencies in peacetime and the patterns of escalation that seem most likely from the viewpoint of a "rational bargainer."

Key Limits to the Data

Far more unclassified data are available from a Republic of Korea ("ROK" or "South Korea"), Japanese, US and Western perspective than from a Chinese or Democratic People's Republic of Korea ("DPRK" or "North Korea") perspective. While individual Chinese or DPRK experts may issue more detailed estimates, it was not possible to find such data in Chinese or DPRK official statements and white papers or such material from Chinese or DPRK Non-Governmental Organizations ("NGO") by conducting a search of the Internet or material easily available in the West.

As a result, the data presented in this analysis reflect the views of Western, ROK, and Japanese experts and have been selected to try to reflect official views or declassified inputs from Western intelligence experts where possible. In some critical cases, such as the data on DPRK missiles and weapons of mass destruction, information has had to be drawn from the work of NGOs. It is obvious in many cases that such data are not fully reliable, although they are a useful indication of Western, ROK, and Japanese perceptions.

The results still illustrate key issues and broad trends, but deciding on a balance precise enough to meet the needs of serious negotiations and arms control presents at least the same need for research and negotiations over basic data that affected the 1991 Strategic Arms Reduction Treaty ("START"), the 1973-1989 Mutual and Balanced Force Reductions ("MBFR") talks, and the talks leading up to the 1990 Conventional Forces in Europe ("CFE") treaty. At this point, there is no common base of perceptions to build upon in any discussions between the various parties involved in the Korean military balance.

The Resource, Arms Import, and Military Spending Balance

Some data are available on the relative weight of military effort in the DPRK and ROK, and in China, Japan, and the US These data are summarized in this report, but it is unclear that they have great value since no meaningful estimates are available for the DPRK. Moreover,

meaningful unclassified data are not available on key areas like arms transfers. There is no consensus on levels of military spending or how to assess them.

More broadly, efforts to compare data between state-controlled and market economies raise major questions as to the comparability of cost. This not only affects investment, but every aspect of manpower and readiness. The DPRK, for example, can command any amount of manpower it wants at the price it wants. The ROK cannot.

The "Conventional" Warfare Balance

The Korean balance involves complex mixes of conventional, irregular, missile and WMD forces and decisions about what areas and external forces must be assessed outside the DPRK and ROK. Even counting regular military forces is hard. It took more than five years for the North Atlantic Treaty Organization ("NATO") to agree on the core elements of the conventional balance in studying its options for MBFR and CFE, and another half-decade for the NATO and the Warsaw Treaty Organization ("WTO" or "Warsaw Pact") to reach an agreement that represented far more a political compromise than a rigid search for analytic validity.

Counting non-Korean forces presents special issues. The balance of DPRK and ROK "conventional" forces cannot be separated from the role US forces would play in a conflict, from Japan's willingness to support US basing and staging into Korea, and from the role China would play in trying to limit any threat to the DPRK as a buffer state. Much would also depend on the conditions that led to a confrontation or actual fighting. Pyongyang might conduct a major conventional build-up to pressure the ROK, Japan, and/or the United States. It might do so to deal with internal unrest by trying to focus the nation on a foreign enemy. It might launch a limited war for the same reasons.

It is doubtful that the ROK would initiate such a conflict. The ROK cannot be sure what level of escalation will follow any response to a limited incident or DPRK action of the kind Pyongyang initiated by sinking the ROK ship *Cheonan* on March 26, 2010, and by firing artillery on the densely populated ROK island of Yeonpyeong on November 23, 2010, killing four people. The ROK might also be confronted with a DPRK succession crisis or massive suppression of the population – creating a strong incentive for some form of decisive ROK military action.

Nevertheless, both the DPRK and ROK both operate in a security environment where the risk of dragging the US and China into a conventional conflict (and the dilemma this would create for Japan) tends to limit the scope of any given conventional war. At the same time, if the DPRK and ROK do go to war with conventional forces, the perceptions of risk and capability may be so different on each side—and involve such complex mixes of the use and threatened use of asymmetric, conventional, nuclear, and long-range missile forces that each side might make a major miscalculation and a conflict might escalate in predictable ways that neither state could control.

Moreover, the DPRK's ideological hostility to the ROK and the US could lead Pyongyang to escalate in ways that are unpredictable and make a "rational bargainer" approach to scenario planning and predicting escalation highly uncertain because the perceptions of both sides can differ so much in any given scenario. The same applies to external actors. For example, a US and Japanese role in support of the ROK – coupled to any ROK success that threatened the existence

of the DPRK – would confront China with the risk of losing a key buffer state. China might or might not choose to intervene at any stage in such a conflict—either to limit or deter any action against the DPRK or to ensure that ROK and US forces did not "occupy" part of the DPRK.

Either side might try to use strategic air and/or missile power in support of its tactical forces, particularly if it appeared to be losing or came under serious pressure. It is possible that a conflict could escalate to conventional fighting affecting Chinese bases, as well as US bases and carrier task forces, including those as far away as Guam and the "outer island chain" the US may use to base long-range bombers and stealth aircraft. Moreover, China might put pressure on Taiwan as a means of indirectly pressuring the US

The naval dimension of a new Korean War is also unpredictable. Pyongyang could use its submarines, smart mines, and longer-range anti-ship missiles in a wide variety of ways, including covert or asymmetric attacks on shipping, possibly even outside Korean waters. It might perceive a naval war, including some kind of attack or seizure of a US ship, as a safer way of exerting pressure. China might or might not become involved, and Japan would have to decide on its naval posture.

The Asymmetric or Irregular Warfare Balance

No prior arms control effort has explicitly attempted to deal with the complex mix of modern capabilities for irregular and asymmetric warfare. All sides, however, have major capabilities for such warfare and are steadily improving and diversifying their capabilities. These capabilities include paramilitary and internal security forces, as well as new capabilities like cyber warfare. They also include the risk of covert attacks on land or at sea, and a strong possibility that both conventional and irregular forces will be used at the same time in some form of "hybrid warfare."

The DPRK has repeatedly challenged the ROK using low level covert operations and asymmetric attacks and has used them to put pressure on both the ROK and the United States. Pyongyang has also deployed large amounts of its force structure for the same purpose, keeping the ROK under constant pressure. It has created a special balance in the border area by creating tunnel systems and deploying large amounts of artillery in caves and sheltered positions within range of ROK's capital, Seoul.

The historical record shows that there was nothing new about the DPRK's use of such attacks in 2010. Pyongyang's willingness—and inventiveness—in using the threat and reality of such attacks was so consistent between 1950 and 2007, that it led the Congressional Research Service to prepare a 36 page chronology which covered 164 examples of armed invasion; border violations; infiltration of armed saboteurs and spies; hijacking; kidnapping; terrorism (including assassination and bombing); threats/intimidation against political leaders, media personnel, and institutions; incitement aimed at the overthrow of the ROK government; actions undertaken to impede progress in major negotiations; and tests of ballistic missiles and nuclear weapons. [1]

As the report from the US Congressional Research Service (CRS) notes,

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[1]Hannah Fischer, *North Korean Provocative Actions, 1950 – 2007*, Congressional Research Service, RL30004, April 20, 2007.

[2] See Seigfried Hecker, "A Return Trip to the DPRK's Yongbyon Nuclear Complex, November 20, 2010, http://iis-

The most intense phase of the provocations was in the latter half of the 1960s, when North Korea (Democratic People's Republic of Korea, or DPRK) staged a series of limited armed actions against South Korean and US security interests. Infiltration of armed agents into South Korea was the most frequently mentioned type of provocation, followed by kidnapping and terrorism (actual and threatened). From 1954 to 1992, North Korea is reported to have infiltrated a total of 3,693-armed agents into ROK, with 1967 and 1968 accounting for 20% of the total. Instances of terrorism were far fewer in number, but they seemed to have had a continuing negative impact on relations between the two Koreas. Not counting the DPRK's invasion of South Korea that triggered the Korean War (1950-1953), the DPRK's major terrorist involvement includes attempted assassinations of President Park Chung Hee in 1968 and 1974; a 1983 attempt on President Chun Doo Hwan's life in a bombing incident in Rangoon, Burma (Myanmar); and a mid-air sabotage bombing of a South Korean Boeing 707 passenger plane in 1987. Reported provocations have continued intermittently in recent years, in the form of armed incursions, kidnappings, and occasional threats to turn the South Korean capital of Seoul into "a sea of fire" and to silence or tame South Korean critics of North Korea. Then, in July 2006, North Korea launched seven missiles into the Sea of Japan, and in October 2006, it tested a nuclear bomb.

The DPRK may well have its own list of charges and complaints, but its public statements are largely political in character. An open source analysis of such material does not seem to be available.

The Nuclear and CBRN Warfare Balance

Counting weapons of mass destruction and delivery systems is equally challenging. The DPRK's nuclear programs, and efforts to acquire nuclear weapons and long-range missiles have been the source of concern and arms control efforts for more than a decade. The DPRK's programs cannot, however, be separated from the impact of US and Chinese nuclear weapons on the balance, or the need to evaluate the impact of chemical and biological weapons, and precision guided weapons. Moreover, "defensive weapons" such as effective air and missile defenses offset at least part of the opposing side's missile and WMD capabilities. There is no easy distinction between "offensive" and "defensive" weapons.

It is also important to note that the DPRK's forces are rapidly evolving. It has conducted two low yield nuclear tests, and has effectively ended its past agreements to limit the production of nuclear materials and its missile tests. While unclassified estimates are to some extent sophisticated guesswork, Pyongyang may have obtained enough plutonium from its power reactors to have 4-13 nuclear weapons, even allowing for the material used in its two tests.

Moreover, Siegfried S. Hecker, a former director of the Los Alamos National Laboratory, reported that, on a visit to Yongbyon, DPRK, he saw a small, sophisticated facility with some 2,000 centrifuges that were "P-2" advanced designs.[2] This means that the DPRK may have significant stocks of enriched uranium, as well as plutonium. At a minimum, this means that the DPRK's future production of weapons grade material is impossible to predict, and that both targeting and arms control are far more difficult because of the inability to predict how many dispersed centrifuge facilities Pyongyang may have.

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[2] See Seigfried Hecker, "A Return Trip to the DPRK's Yongbyon Nuclear Complex, November 20, 2010, http://iis-db.stanford.edu/pubs/23035/Yongbyonreport.pdf; David Albright and Paul Brannan, "Satellite Image Shows Building Centrifuges in North Korea," ISIS, November 21, 2010, and "Taking Stock: the DPRK's Uranium Enrichment Program, October 8, 2010;" Jonathan Medalia, "The DPRK's 2009 Nuclear Test: Containment, Monitoring, Implications," Congressional Research Service, R41160, November 24, 210; Kwang Ho Chun, the DPRK's Nuclear Question: Sense of Vulnerability, Defensive Motivation, and Peaceful Solution," Strategic Studies Institute, US Army War College, December 2010.

Similar uncertainties arise because of the inability to predict how sophisticated the DPRK's weapons and warhead design capabilities are. US experts feel that Pyongyang has obtained some advanced missile warhead design data, and this was confirmed by the sale of some of these data by the A. Q. Khan network.

Moreover, the DPRK's ambitious missile programs are still largely in development and their capabilities are impossible to predict until the nature of a nuclear warhead is known, and there have been enough tests of the DPRK's longer range missiles to provide a clear picture of their performance.

However, the DPRK's longer-range *Nodong* MRBM missile (700-1,500 kg warhead and 1,000-1,500 km range) is still developmental and would require large numbers of additional, full range, tests to become a mature program. The Japanese Defense White Paper for 2010 reports that Japan believes that tests were limited to a possible launch into the Japan Sea in late May 1993, a mix of Scud and *Nodong* launches on July 5, 2006, and a mix of launches that might have involved some *Nodongs* from the Kittareryong district of the DPRK on July 4, 2009.[3]

Some experts feel that the DPRK's larger *Taepodong 1* MRBM missile (1,000-1,500 kg warhead and 1,500-2,500 km range) has never been launched, except as a Space Launch Vehicle ("SLV"). The Japanese Defense White Paper for 2010 reports one successful launch occurred on August 31, 1998. Similarly some experts believe the *Taepodong 2* Inter-Continental Ballistic Missile ("ICBM") (500-1,500 kg warhead and 4,500-8,000 km range) has never been launched, and it is not clear whether its missile engines have been used as an SLV. The Japanese Defense White Paper for 2010 reports one failed launch occurred in July 1996, and a second launch on April 5, 2009 when the DPRK fired a missile that may have been a *Taepodong* 2 into the sea at a range over 3,000 kilometers. [4]

Another system, the DPRK's *Musudan* Intermediate-Range Ballistic Missile ("IRBM") (650-1,000 kg warhead and 2,500-3,200 km range) may be a copy or modification of the Russian R-27/BM-25 series. It may have been launched at very short ranges for test purposes, but is not operational. These uncertainties make it impossible to estimate any of these missiles' reliability and accuracy, and whether the DPRK has anything approaching some form of terminal guidance technology.[5]

The DPRK's focus on nuclear weapons and long-range missile programs raises important issues for the Korean balance *per se*, and for the US in deterring or responding to the DPRK threat or reality of using nuclear weapons against the ROK. This threat, however, cannot be limited to the Korean peninsula. It already extends to Japan and US bases in Japan. US reaction again raises

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[3] See Joseph S. Bermudez, "Going Ballistic – The DPRK's Advanced Missile Capabilities, " *Jane's Intelligence Review*, 2009;" Daniel A. Pinkston, *The North Korean Ballistic Missile Program*, Strategic Studies Institute, US Army War College, February, 2008; and Japanese Ministry of Defense, *2010 Defense White Paper*, English translation, pp. 43-35.

[4] See Joseph S. Bermudez, "Going Ballistic – The DPRK's Advanced Missile Capabilities, " *Jane's Intelligence Review*, 2009;" Daniel A. Pinkston, *The North Korean Ballistic Missile Program*, Strategic Studies Institute, US Army War College, February, 2008; and Japanese Ministry of Defense, *2010 Defense White Paper*, English translation, pp. 43-35.

[5] See Joseph S. Bermudez, "Going Ballistic – The DPRK's Advanced Missile Capabilities, " *Jane's Intelligence Review*, 2009;" Daniel A. Pinkston, *The North Korean Ballistic Missile Program*, Strategic Studies Institute, US Army War College, February, 2008,

the issue of what China's response would be and whether a crisis could escalate to the point where the US-Chinese strategic and nuclear balance became relevant—a threat that could force Japan to make hard choices of its own.

As is noted in the introduction, however, DPRK nuclear weapons programs are only part of a far wider range of important issues in assessing the Korean balance:

- The US and China are major nuclear powers, with boosted and thermonuclear weapons. While neither is likely to use nuclear weapons, they have that capability, and—at a minimum—it plays a major role in the balance of deterrence and in shaping the risks of asymmetric escalation.
- The DPRK has implosion fission weapons. Its numbers, weapons yields, and ability to create reliable bombs and missile warheads are uncertain, but it seems likely it either has them or is rapidly moving towards acquiring them. It almost certainly has programs to develop boosted and thermonuclear weapons, but there status is unknown.
- The ROK had a covert nuclear weapons program that it halted after quiet negotiations with the US. This gives it a significant nuclear breakout capability if it should reverse its decisions.
- Japan is unlikely to have nuclear weapons programs, but has all of the technology and material necessary to rapidly acquire them and develop boosted and thermonuclear weapons.
- The US and China have nuclear-armed aircraft and ICBMs, IRBMs, MRBMs, and SRBMs with boosted and thermonuclear weapons. The DPRK may have long-range tactical and theater missiles with implosion nuclear weapons.
- The DPRK is a major chemical weapons state, and probably has advanced chemical warheads and bombs. China may have stocks of chemical weapons. There is no way to estimate the size, type, and lethality/effectiveness of their relative stockpiles, or doctrine and plans for using them. It should be noted, however, that relatively crude mustard gas weapons played a decisive role in area denial and disruption of Iranian forces in the final phase of the Iran-Iraq War in 1988, and that stocks of persistent nerve gas and so-called 4th generation chemical weapons are possible. The ROK is suspected to have a chemical weapons program, and may have covert stocks of chemical weapons.
- The DPRK is strongly suspected to have a biological weapons program and may have stocks of such weapons. These could range from basic weapons types to genetically modified types. China's program is not discussed in unclassified official statements. The ROK may have a program. It should be noted that China, Japan, the DPRK, the ROK, and the US all have advanced civil biological, food processing, chemical processing, and pharmaceutical facilities that can be adapted to both chemical and biological weapons development and production. All have significant capability for genetic engineering of biological weapons. All would have to develop advanced biological weapons for test purposes to conduct an effective biological defense program.
- No public details are available on the efforts of any power to develop small or specialized chemical, biological, radiological, or nuclear weapons for covert delivery or potential transfer to non-state actors and third countries.
- China and the DPRK have large numbers of conventionally armed long-range missiles capable of hitting targets in the ROK. The nature of their conventional warheads is not clear, and this is critical since unity conventional warheads have limited lethality, and terminal guidance is needed to provide the accuracy necessary to strike at high value, rather than broad area targets. China and the DPRK may already have, and are certainly developing, ballistic and cruise missiles with some form of terminal guidance.
- The US has large numbers of precision-guided long range cruise missiles for air and sea launch, and precision-guided long-range multiple rocket launchers. US stealth aircraft can deliver precision-guided weapons at standoff ranges from most Chinese and DPRK surface-to-air missiles with the exception of the S300/S400 series. China is developing long-range anti-ship ballistic missiles that can strike large surface ships like US carriers at long distances. These potentially are "weapons of mass effectiveness" that can launch devastating strikes against critical facilities and infrastructure without the use of WMD warheads.

- The US, Japan, and the ROK have some ballistic missile defense capability and are working together to develop wide area theater ballistic missile defense systems. China has the Russian S300/S400 series of advanced surface-to-air missile defenses, and is almost certainly seeking more advanced missile defense capabilities. The DPRK lacks such capabilities, but is almost certainly seeking them. The balance of air and missile defense capabilities plays a critical role in limiting the offensive capabilities of the opposite side and reducing the risk in using one's own missiles. This makes air and missile defenses the equivalent of a major offensive weapon.
- China, the US, the ROK, and possibly the DPRK, all have advanced cyberwarfare capabilities. China has some anti-satellite capability, and possibly some form of EMP weapon. These too are potential "weapons of mass effectiveness" that can launch devastating strikes against critical facilities and infrastructure without the use of WMD warheads.

Current arms control efforts and assessments of the Korean balance may focus on the DPRK's nuclear programs, but they are only part of a far more complex and rapidly evolving mix of current and potential capabilities to deliver weapons of mass destruction or mass effectiveness. The threat that such weapons may be used also cannot be limited to the Korean peninsula. It already extends to Japan and US bases in Japan. US reaction again raises the issue of what China's response would be and whether a crisis could escalate to the point where the US-Chinese strategic and nuclear balance became relevant – a threat that could force Japan to make hard choices of its own.

The range of uncertainties on this list also raises two key issues for arms control. One is the the "diversion effect:" the risk that nuclear controls can drive states even more towards advanced biological and chemical weapons. Advances in biotechnology have made control regimes virtually impossible, as well as vastly increased the potential lethality of biological weapons to levels beyond that of even boosted and thermonuclear weapons.

The second is the so-called "Nth weapon paradox." It may be possible to reduce a nation's nuclear weapons, but it is probably impossible to be certain it does not retain at least a few. The problem for arms control is that the smaller the stockpile, the more it has to be used in ways that threaten critical targets like major population centers rather than a given military target. Arms reductions can easily escalate targeting.

It is equally clear that the nuclear threat already is only part of the WMD threat. The DPRK has long been a chemical weapons power. It is believed to have active biological weapons programs, and it clearly has long-range missile programs that can target Japan and any target in the ROK. These missiles can potentially be armed with a range of Chemical, Biological, Radiological or Nuclear ("CBRN") warheads – but no meaningful unclassified evidence exists of the range of such warheads or their lethality. The same is true of DPRK bombs and rocket warheads. This means that CBRN escalation could occur at a wide range of unpredictable levels – including asymmetric, covert, and terrorist attacks. Moreover, Pyongyang is already acquiring missile engines and boosters that will give it ICBM capabilities to attack targets in the US

The Balance of Weapons of Mass Effectiveness and "Offensive" vs. "Defensive" Weapons

At the same time, conventionally armed, precision-guided weapons can also be used to threaten or attack critical targets. It is unclear how accurate the DPRK's missiles are, and whether Pyongyang has a real-world terminal guidance capability to use in combination with ballistic missiles—or whether the DPRK can develop such systems for cruise missiles. As long as the

DPRK does not have such "smart" warheads, conventionally armed missiles are largely terror weapons that can produce limited casualties and damage to targets as large as cities or military facilities as large as airfields. Once the DPRK does have a real-world terminal guidance capability, however, such missiles may become "weapons of mass effectiveness" that can destroy high-value and critical infrastructure targets with conventional warheads.

This could lead to new patterns of escalation where the US and ROK used or threatened to use precision guided air-to-surface, surface-to-surface, and cruise missiles to destroy critical DPRK targets in an effort to halt or deter a DPRK conventional attack.

Cyber-warfare is becoming steadily more critical, and affects civilian operations as well as war fighting. It is important to note that the ROK is probably more dependent on the Internet than any other nation in the world. Any use of Anti-Satellite ("ASAT") weapons could also have a massive impact on US battle management and Intelligence, Surveillance & Reconnaissance ("IS&R") systems.

Moreover, the fact so many missile and precision air strike systems are being deployed has turned "defensive" weapons such as ballistic missile defenses and surface-to-air missile forces into "offensive" forces as well. The comparative ability to defend also equates to the ability reduce the risk in escalating to offensive missile, air, and stealth attacks.

The Balance of Different Perceptions

This report examines each of these "balances" using a range of different sources. The primary statistical data on the military balance are drawn from reporting by the Institute for Strategic Studies, but these are supplemented in each section by a range of data taken from US, Japanese, and ROK official sources, other NGOs, and defense reporting be sources like Jane's. Similar data are not available in meaningful detail from unclassified DPRK and Chinese sources.

It should be noted that major differences exist in the estimates of given sources both in terms of data on given military forces, and as to how the balance should be assessed. It is clear that any model for negotiations and arms control would present at least the same need for research and negotiations over basic data that affected the START, MBFR, and CFE talks. At this point, there is no common base of perceptions to build upon.

Section 1: Korean and Northeast Asia Military Expenditures and Comparative Resources

It is not possible to make meaningful comparisons of DPRK and ROK military expenditures using unclassified data. No government provides such comparisons, and the International Institute for Strategic Studies does not make estimates for the DPRK. Estimates of Chinese military expenditures are highly controversial, and raise major questions regarding the extent to which definitions of such estimates are comparable in terms of both what is included and prices. Moreover, there is no clear way to relate US military spending to the Korean balance, although US military capabilities play a major role in that balance.

East Asian Military Spending

In the past, the US Department of State issued comparable estimates of military effort and arms transfers based on models that estimated the size of each military effort based on comparable prices. These reports have long been discontinued, however, and no think tank or NGO has the resources or access to intelligence to make credible estimates on its own.

DPRK Military Spending

It is possible, however, to make some comparisons for Asian countries other than the DPRK. In broad terms they show that ROK and Japanese national security expenditures have been relatively static, while China is emerging as a major regional military power. Moreover, *Jane's* has developed some useful material on the size of the DPRK effort, drawn from ROK sources, and this report concludes that,

> The DPRK's defense budget reached nearly USD 9 billion in 2009, around 15 times more than the official amount declared by Pyongyang, the state-run Korea Institute of Defense Analyses ("KIDA") has said in a report…The KIDA report—cited by the state-funded *Yonhap* news agency on 18 January—said North Korea had previously announced a USD 570 million defense budget, although the real expenditure, calculated on an exchange rate based on Purchasing Power Parity ("PPP") terms, was USD 8.77 billion … *Yonhap* quoted the report as saying, "In spite of its economy shrinking since the mid-2000s, North Korea has gradually increased its military spending."
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> According to KIDA, official North Korea figures state that the defense budget increased to USD 570 million in 2009 from USD 540 million in 2008, USD 510 million in 2007 and USD 470 million in 2006, although these figures do not reflect PPP … Previous estimates have indicated that DPRK defense spending is equal to at least 15 per cent of [Gross Domestic Product] ("GDP"). In 2008 Pyongyang said it was allocating 15.8 percent of GDP on defense although it has not released any GDP figures for a number of years. In 2009 the US Department of State stated that the DPRK's defense spending was more than 22 percent based on its estimate that the DPRK's GDP in 2009 was USD 40 billion based on PPP … How much North Korea is allocating towards defense procurement is similarly contested but it is thought to be at least 40 per cent of its expenditure, with most of these finances directed at centrally controlled indigenous programs: a consequence of the DPRK's impoverished economy and its international isolation.

Some of these figures reflect Western views, while others are little more than educated guesses. They are almost certainly correct however, in indicating that the DPRK is willing to devote far more of its total economy to national security expenditures than the ROK. By contrast, in 2009 the ROK's military expenditures amounted to $US27.1 billion, or 2.80% of the country's GDP.

DPRK and ROK Military Modernization

Figures 1.7 and 1.8 provide a different approach to measure relative military effort.

- **Figure 1.7 compares DPRK and ROK military modernization.**
- **Figure 1.8 summarizes the modernization plans through 2020 that the ROK issued in 2005.**

There are serious limits to the unclassified data available for comparisons of DPRK and ROK military modernization. Unclassified sources do not include many smart munitions, they only cover a limited amount of other weaponry, and they do not reflect investments in logistics and transport. They also do not include battle management, IS&R, or Command, Control, Communications, and Computer ("C4") assets. These are becoming steadily more critical aspects of military modernization

Nevertheless, **Figure 1.7** shows that the ROK has modernized more rapidly and with more advanced equipment than the DPRK, while Pyongyang has focused on force expansion. The ROK has almost achieved a massive lead in modern aircraft and surface-to-air missiles. **Figure 1.8** shows that the ROK has an effective plan for force modernization through 2020 – a plan it has upgraded since 2005. There is no unclassified DPRK equivalent.

DPRK and ROK Capacity for Military Efforts

There are some useful data on each country's capacity to develop and support its forces. The CIA estimates that the DPRK had a GDP in 2010 worth roughly $40 billion (ranking 98th in the world), while the ROK's GDP was worth some $1.5 trillion (ranking 13th in the world), or nearly 37 times that of that of the DPRK. It also estimated that the DPRK had a GDP per capita worth some $1,900 (ranking 196th in the world), while the ROK's GDP per capita was worth some $30,200 (ranking 45th in the world), or more than 16 times of that of the DPRK.[6]

The CIA draws a sharp contrast between the economies of the DPRK and the ROK: [7]

> North Korea, one of the world's most centrally directed and least open economies, faces chronic economic problems. Industrial capital stock is nearly beyond repair as a result of years of underinvestment and shortages of spare parts. Large-scale military spending draws off resources needed for investment and civilian consumption. Industrial and power output have declined in parallel from pre-1990 levels. Severe flooding in the summer of 2007 aggravated chronic food shortages caused by on-going systemic problems, including a lack of arable land, collective farming practices, and persistent shortages of tractors and fuel. Large-scale international food aid deliveries have allowed the people of North Korea to escape widespread starvation since famine threatened in 1995, but the population continues to suffer from prolonged malnutrition and poor living conditions. Since 2002, the government has allowed private "farmers' markets" to begin selling a wider range of goods. It also permitted some private farming - on an experimental basis - in an effort to boost agricultural output. In October 2005, the government tried to reverse some of these policies by forbidding private sales of grains and reinstituting a centralized food rationing system. By December 2005, the government terminated most international humanitarian assistance operations in North Korea (calling instead for developmental assistance only) and restricted the activities of remaining international and non-governmental aid organizations. In mid-2008, North Korea began receiving food aid under a US program to deliver 500,000 metric tons of food via the World Food Program and US nongovernmental organizations; but Pyongyang stopped accepting the aid in March 2009. In December

[6] CIA, World Factbook, "North Korea" and South Korea," https://www.cia.gov/library/publications/the-world-factbook/geos/ks.html, accessed January 27, 2011. GDP measured in purchasing power parity terms.

[7] CIA, World Factbook, "North Korea" and South Korea," https://www.cia.gov/library/publications/the-world-factbook/geos/ks.html, accessed January 27, 2011.

> 2009, North Korea carried out a redenomination of its currency, capping the amount of North Korean won that could be exchanged for the new notes, and limiting the exchange to a one-week window. A concurrent crackdown on markets and foreign currency use yielded severe shortages and inflation, forcing Pyongyang to ease the restrictions by February 2010. Nevertheless, firm political control remains the Communist government's overriding concern, which likely will inhibit changes to North Korea's current economic system.
>
> … Since the 1960s, South Korea has achieved an incredible record of growth and global integration to become a high-tech industrialized economy. Four decades ago, GDP per capita was comparable with levels in the poorer countries of Africa and Asia. In 2004, South Korea joined the trillion-dollar club of world economies, and currently is among the world's 20 largest economies. Initially, a system of close government and business ties, including directed credit and import restrictions, made this success possible. The government promoted the import of raw materials and technology at the expense of consumer goods, and encouraged savings and investment over consumption. The Asian financial crisis of 1997-98 exposed longstanding weaknesses in South Korea's development model including high debt/equity ratios and massive short-term foreign borrowing. GDP plunged by 6.9% in 1998, and then recovered by 9% in 1999-2000. Korea adopted numerous economic reforms following the crisis, including greater openness to foreign investment and imports. Growth moderated to about 4-5% annually between 2003 and 2007. With the global economic downturn in late 2008, South Korean GDP growth slowed to 0.2% in 2009. In the third quarter of 2009, the economy began to recover, in large part due to export growth, low interest rates, and an expansionary fiscal policy, and growth exceeded 6% in 2010. The South Korean economy's long-term challenges include a rapidly aging population, inflexible labor market, and overdependence on manufacturing exports to drive economic growth.

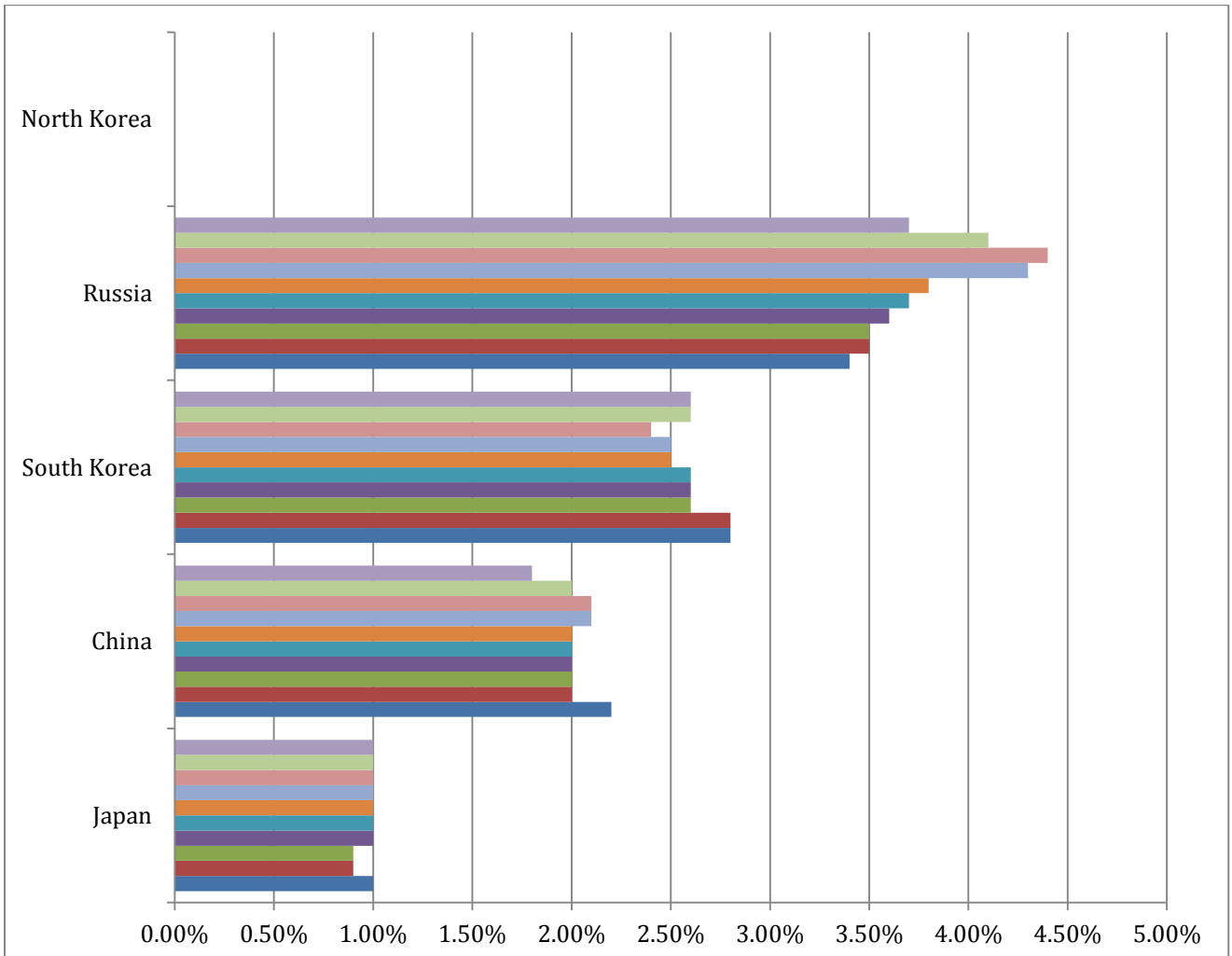
The CIA estimates that the DPRK had a total population of 22.7 million, while the ROK's population is 48.6 million, or more than 2.1 times that of the DPRK. It estimates the median age of the DPRK's population at 33.9 years, and that of the ROK at 37.9 years. Finally it estimates that the DPRK has 6.1 million males eligible for military service and 885,000 young men entering military age each year, while the ROK has 13.3 million eligible males and 371,000 males entering military age. [8]

All of these data show that the ROK has far more resources to use in supporting its national security structure than the DPRK, and that overall trends are likely to remain significantly in the ROK's favor.

The World Bank and UN make somewhat different estimates, but all agree that the ROK has a vastly larger economy, with far better income distribution and personal wealth and has far more personnel that can be devoted to military service. The ROK's disadvantages are that its population has much higher expectations; it must pay far more for manpower, must price military investment in market rather than command terms, and finds it harder to command popular sacrifices in the name of enhanced security.

[8] CIA, World Factbook, "North Korea" and South Korea," https://www.cia.gov/library/publications/the-world-factbook/geos/ks.html, accessed January 27, 2011.

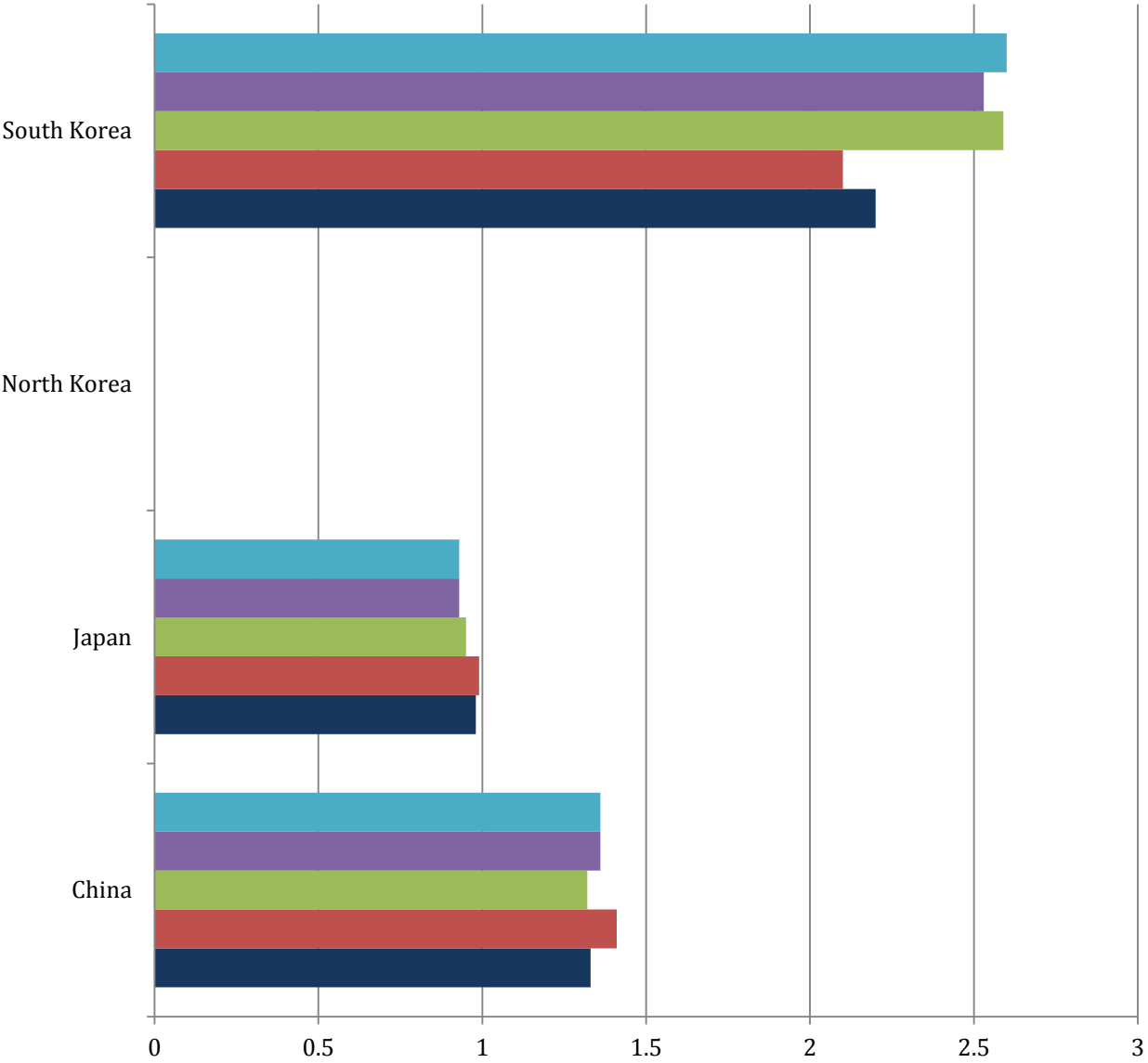
Figure 1.1: Military Expenditures as a Percentage of GDP: 2000-2009 (SIPRI)



	Japan	China	South Korea	Russia	North Korea
2000	1.00%	1.80%	2.60%	3.70%	
2001	1.00%	2.00%	2.60%	4.10%	
2002	1.00%	2.10%	2.40%	4.40%	
2003	1.00%	2.10%	2.50%	4.30%	
2004	1.00%	2.00%	2.50%	3.80%	
2005	1.00%	2.00%	2.60%	3.70%	
2006	1.00%	2.00%	2.60%	3.60%	
2007	0.90%	2.00%	2.60%	3.50%	
2008	0.90%	2.00%	2.80%	3.50%	
2009	1.00%	2.20%	2.80%	3.40%	

Based on data provided by SIPRI Military Expenditure Database, *Stockholm International Peace Research Institute.* http://www.sipri.org/databases/milex. Data for North Korea is unavailable.

Figure 1.2: Defense Expenditures as a Percentage of GDP (IISS): 2006-2010

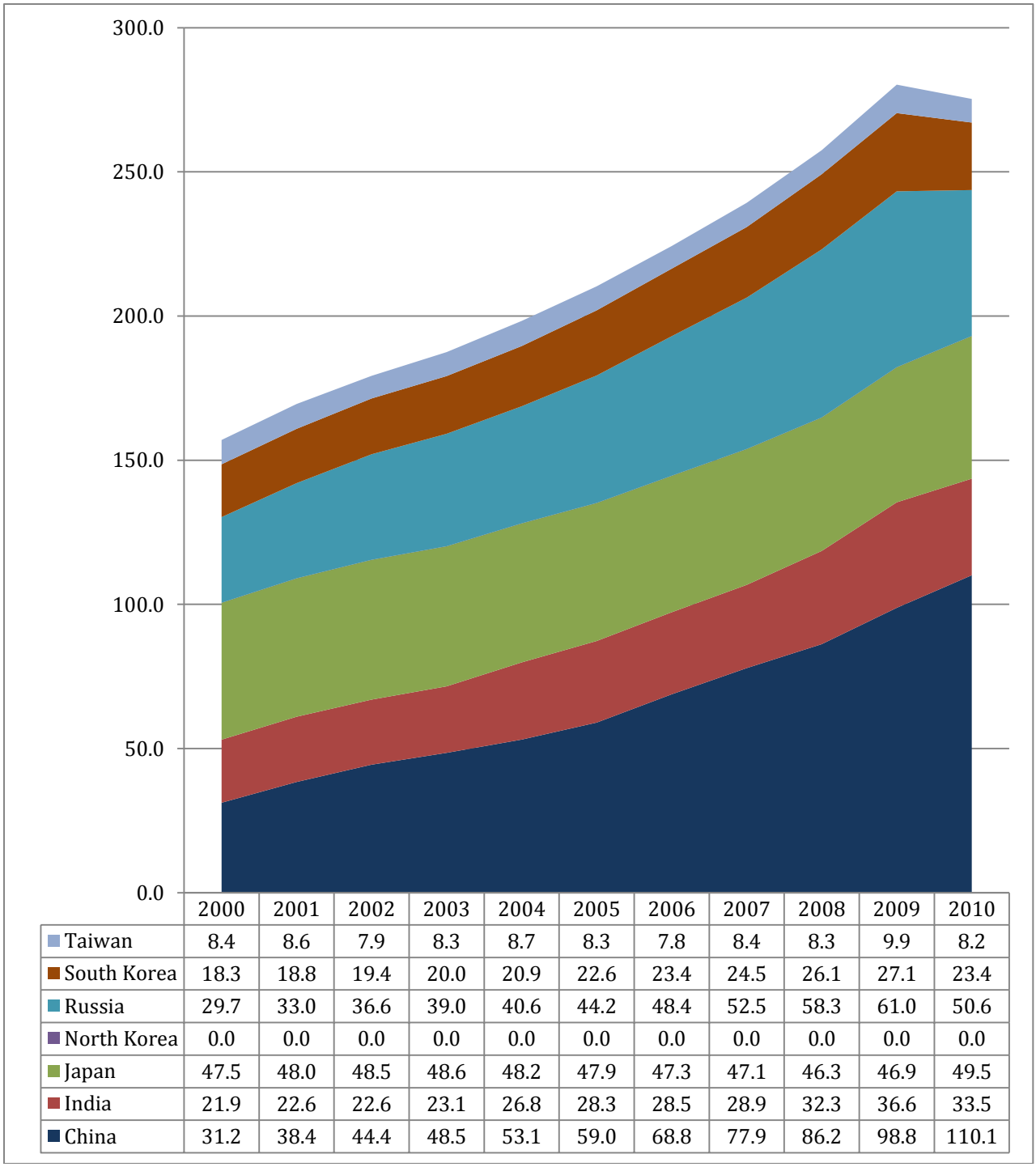


	China	Japan	North Korea	South Korea
2006	1.36	0.93		2.6
2007	1.36	0.93		2.53
2008	1.32	0.95		2.59
2009	1.41	0.99		2.1
2010	1.33	0.98		2.2

Based primarily on material in International Institute for Strategic Studies, *The Military Balance 2010* (London: Routledge, 2010).

Figure 1.3: Military Expenditures by the Major Asian Powers: 2000-2010 (SIPRI)

(In $US Billions, 2008)

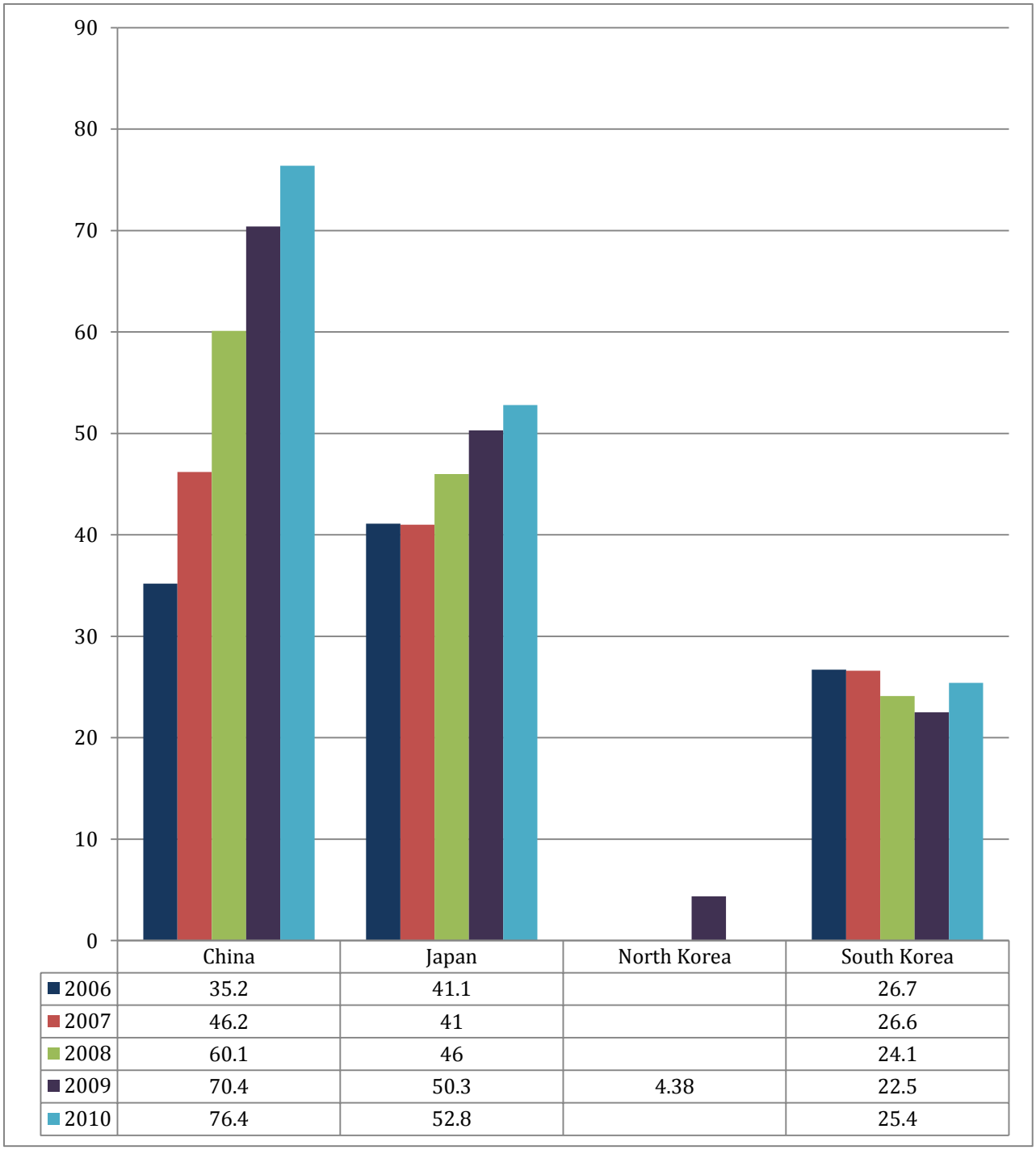


	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Taiwan	8.4	8.6	7.9	8.3	8.7	8.3	7.8	8.4	8.3	9.9	8.2
South Korea	18.3	18.8	19.4	20.0	20.9	22.6	23.4	24.5	26.1	27.1	23.4
Russia	29.7	33.0	36.6	39.0	40.6	44.2	48.4	52.5	58.3	61.0	50.6
North Korea	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Japan	47.5	48.0	48.5	48.6	48.2	47.9	47.3	47.1	46.3	46.9	49.5
India	21.9	22.6	22.6	23.1	26.8	28.3	28.5	28.9	32.3	36.6	33.5
China	31.2	38.4	44.4	48.5	53.1	59.0	68.8	77.9	86.2	98.8	110.1

Based on data provided by SIPRI Military Expenditure Database, *Stockholm International Peace Research Institute.* http://www.sipri.org/databases/milex. Data for North Korea is unavailable.

Figure 1.4: Northeast Asian Defense Expenditures: 2000-2010 (IISS)

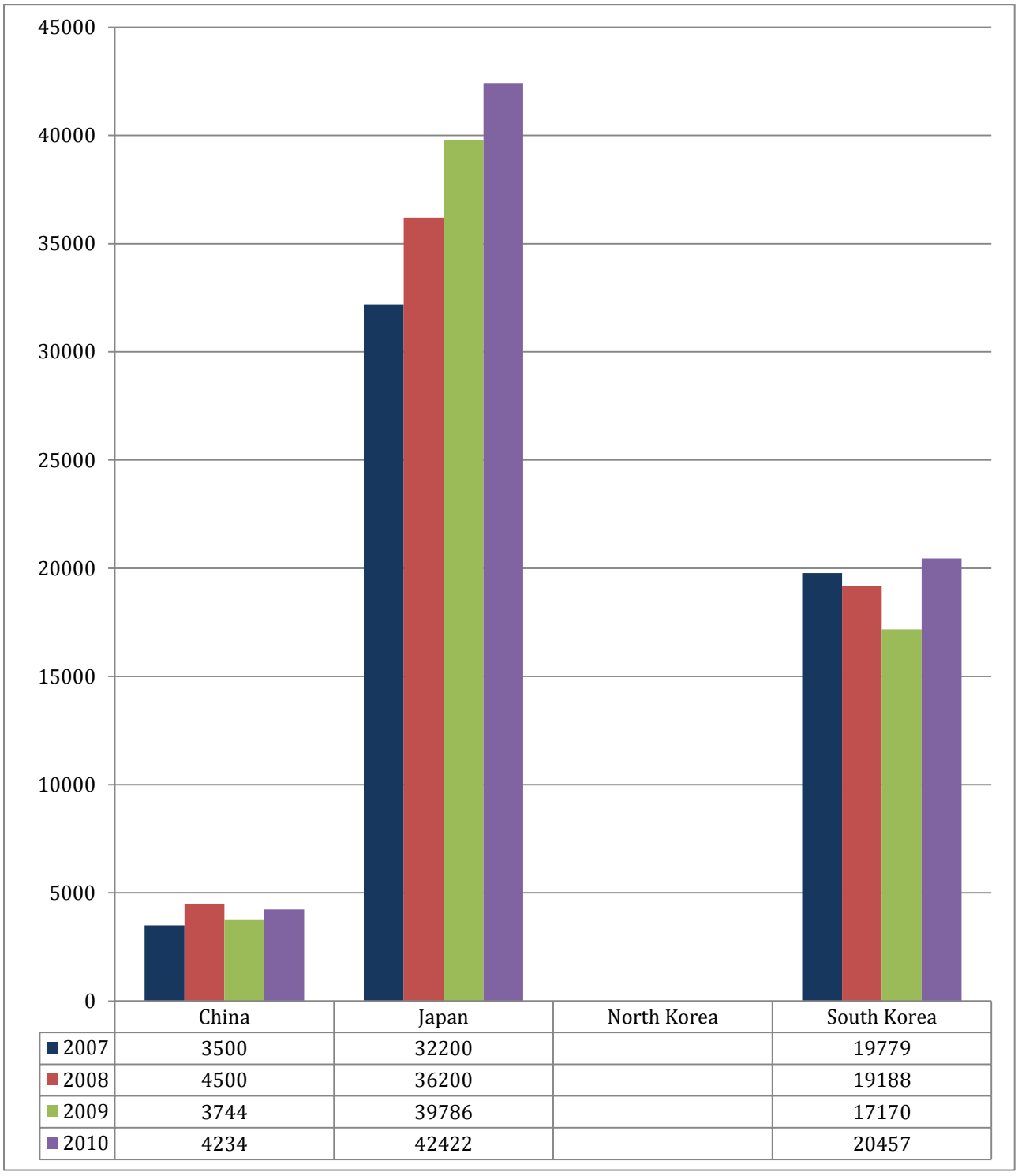
(Billions $US)



	China	Japan	North Korea	South Korea
2006	35.2	41.1		26.7
2007	46.2	41		26.6
2008	60.1	46		24.1
2009	70.4	50.3	4.38	22.5
2010	76.4	52.8		25.4

Based primarily on material in International Institute for Strategic Studies, *The Military Balance 2011* (London: Routledge, 2011). Only 2009 data was available for North Korea.

Figure 1.5: Northeast Asian Per Capita Defense Expenditures (USD): 2007-2010 (IISS)



	China	Japan	North Korea	South Korea
2007	3500	32200		19779
2008	4500	36200		19188
2009	3744	39786		17170
2010	4234	42422		20457

Based primarily on material in International Institute for Strategic Studies, *The Military Balance 2010* (London: Routledge, 2010). Data for North Korea unavailable.

Figure 1.6: The DPRK Defense Budget[9]

North Korea's defense budget reached nearly USD9 billion in 2009, around 15 times more than the official amount declared by Pyongyang, the state-run Korea Institute of Defense Analyses (KIDA) has said in a report.

The KIDA report - cited by the state-funded Yonhap news agency on 18 January - said North Korea had previously announced a USD570 million defense budget, although the real expenditure, calculated on an exchange rate based on purchasing power parity (PPP) terms, was USD8.77 billion.

Yonhap quoted the report as saying, "In spite of its economy shrinking since the mid-2000s, North Korea has gradually increased its military spending." According to KIDA, official North Korea figures state that the defense budget increased to USD570 million in 2009 from USD540 million in 2008, USD510 million in 2007 and USD470 million in 2006, although these figures do not reflect PPP.

Previous estimates have indicated that North Korean defense spending is equal to at least 15 per cent of GDP. In 2008 Pyongyang said it was allocating 15.8 per cent of GDP on defense although it has not released any GDP figures for a number of years. In 2009 the US State Department stated that North Korea's defense spending was more than 22 percent based on its estimate that North Korea's GDP in 2009 was USD40 billion based on PPP.

How much North Korea is allocating towards defense procurement is similarly contested but it is thought to be at least 40 percent of its expenditure, with most of these finances directed at centrally controlled indigenous programs: a consequence of North Korea's impoverished economy and its international isolation.

Despite this, Russia, China and parts of Eastern Europe and the Middle East are thought to have supplied Pyongyang with selected critical equipment, replacement parts and technologies in recent years, most of which have been to support the country's nuclear and ballistic missile programs.

The West has attempted to curtail North Korea's indigenous military programs most notably through a range of sanctions. The most recent measures to this effect were introduced in 2009 and 2010 following a series of missile tests and a detonation of a nuclear device carried out by Pyongyang in the first half of 2009, and the sinking of the Republic of Korea Navy's corvette *Chon An* in March last year off the coast of North Korea.

Some analysts believe, however, that these increasing restrictions are prompting North Korea to form a closer defense partnership with China. Marcus Noland, a deputy director and senior fellow at the Peterson Institute for International Economics in Washington, DC, wrote in an academic paper in 2009: "An unintended consequence [of the sanctions] has been to dramatically raise the share of North Korea's trade with China, and with Iran, Syria and Egypt - countries with which it shares nuclear and/or missile interests...This geographical shift in trade makes traditional sanctions even less potent."

[9] Jon Grevatt, "Analysts reveal 'real' North Korea 2009 defense budget," *Jane's Defense Weekly,* January 19, 2011.

Figure 1.7: Military Modernization Trends on Korean Peninsula

Democratic People's Republic of Korea (DPRK)[10]

The DPRK has deliberately pursued an asymmetric strategy to enhance its long-range strike capability against civilian and military targets to compensate for declining conventional capabilities. Specific attention has been focused on self-propelled artillery, multiple rocket launchers, and ballistic missiles. More reliance has also been given to the Special Forces, tasked with stealthy infiltration of the ROK rear. According to the 2010 ROK White Paper, DPRK Special Forces have been augmented to a 200,000 end-strength, up from 180,000 in 2008. Some key equipment modernization trends in the last decade are outlined below.

Army

Type	2000	2011	Remarks
MBTs	3,500	3,500	IISS reported no changes in DPRK MBT holdings but the 2010 ROK White Paper noted the introduction of the *Pokpung-Ho* (Storm Tiger), believed to be modeled on the T-72

Air Force (and Air Defense)

Type	2000	2011	Remarks
SAMs	45 SA-2 7 SA-3 2 SA-5	179 SA-2 133 SA-3 38 SA-5	Major reported increase in DPRK SAM holdings
Combat Aircraft	16 MIG-29 *Fulcrum*	35 MIG-29 *Fulcrum*	
Transport Aircraft	300 An-2	200 An-2	The An-2s are a key component of DPRK asymmetric strategy designed to facilitate the infiltration of Special Forces into the ROK rear
UAV		*Shmel*	Introduced in 2005.
Attack Helicopters		20 Mi-24 *Hind*	

Navy

Type	2000	2011	Remarks
Submarines	26 SSK PRC Type-031/FSU *Romeo* 45 SSI	22 SSK PRC Type-031/FSU *Romeo* 28 SSI	Aggregate decrease in total DPRK submarines with 5 SSKs either retired or not operational in 2011. The bulk of decreases were in SSI submarine holdings.

All figures unless otherwise noted are based primarily on material in International Institute for Strategic Studies, *The Military Balance 2011* (London: Routledge, 2011).

[10] Jonathan Pollack, "The Strategic Futures and Military Capabilities of the Two Koreas," in Ashley Tellis, Michael Wills, *Strategic Asia 2005-2006: Military Modernization in an Era of Uncertainty*, (DC: National Bureau of Asian Research, 2005).

Republic of Korea (ROK)[11]

In the last decade the ROK has been confronted with major choices and dilemmas including reductions in manned US units on its territory, a greater desire for autonomy within the US-ROK alliance and a hostile threat environment. These trends have pushed the ROK to increase its capabilities in areas previously overseen by US forces, notably in surveillance, reconnaissance and early warning. In 2005 the ROK Ministry of Defense released 'The Defense Reform 2020 Initiative' which outlined ROK strategy to create a slimmer and more "self-reliant" military focused on technological improvements. Some key goals included procuring advanced aircraft and transforming a largely coastal patrol force into a blue-water navy[12] DPRK hostilities in 2010 have also pushed ROK leaders to amend their reform plans to pursue a more aggressive strategy to guard against future DPRK hostilities. These have included increased militarization in the Yellow Sea to convert its five islands into "fortresses,"[13] reducing the magnitude of the proposed troop cut to retain army manpower at 517,000 instead of 500,000, increasing anti-submarine warfare (ASW) helicopters in the wake of the sinking of the *Cheonan* and strategizing means to combat the DPRK's irregular warfare tactics.[14] Major equipment modernization trends are outlined below.

Army

Type	2000	2011	Remarks
Battle Tanks	800 Type-88 (K1)	1484 K1/K1A1	Armor holdings increased from about 2,130 to 2,410 by 2010 with an emphasis on shifting towards third-generation MBTs
APCs		300 Bv206	
Artillery		K-9 *Thunder*	Introduced in 2005, the K-9 self-propelled howitzer was designed to replace the aging M109A2 and significantly increase the ROK's artillery capacity.
SAMs	110 MIM-23B *I-HAWK*	*Chung Ma Pegasus* (SP) 158 MIM-23B *I-HAWK*; 48 Patriot (on delivery)	

Navy

Type	2000	2011	Remarks
Submarines	3 KSS-1 *Dolgorae*	9 *Chang Bogo* 3 SSK *Son Won-ill* 2 KSS-1 *Dolgorae*	8 SSI *Dolphins* were phased out within this period
Destroyers	3 *King Kwanggaeto* 3 *Kwang-Ju*	1 *Sejong* KDX-III 6 *Chungmugong Yi Sun-Jhin* KDX-II 3 *Gwanggaeto Daewang* KDX-I	In order to reach their goal to become a blue-water navy by 2020, the decade saw major developments with new lines of indigenous destroyers being deployed and total numbers increasing from 6 to 10 by 2010. Older surface ships appear to have been retired.
Corvettes		3 *Gumdoksuri* 4 *Po Hang* 4 *Dong Hae*	

[11] Jonathan Pollack, "The Strategic Futures and Military Capabilities of the Two Koreas," in Ashley Tellis, Michael Wills, *Strategic Asia 2005-2006: Military Modernization in an Era of Uncertainty*, (DC: National Bureau of Asian Research, 2005)
[12] Bruce Bennett, "A Brief Analysis of the Republic of Korea's Defense Reform Plan," *RAND*, 2006. Available at http://www.rand.org/pubs/occasional_papers/2006/RAND_OP165.pdf
[13] "Korea push to build military fortresses," *AP*, December 7, 2010. Available at http://www.guardian.co.uk/world/2010/dec/07/south-korea-build-military-fortresses
[14] "Pyongyang threat spurs defense re-think," *Oxford Analytica*, January 24, 2011. Available at http://www.oxan.com/SubscriptionServices/DailyBrief/Samples/SouthKoreaMilitaryPosture.aspx; "South Korea's Defense Reform Initiative 2020 under intense review," *Asia Defense (Blog)*, May 29, 2010. Available at http://theasiandefence.blogspot.com/2010/05/south-koreas-defense-reform-initiative.html

Naval Aviation	23 combat capable fixed-wing aircraft (15 S-2Es, 8 P-3C *Orion*) 12 *Lynx* (ASW)	8 combat capable fixed-wing aircraft (P-3C *Orion)* 24 *Lynx* MK99/MK99A (ASW)	Decrease in total naval aviation. Fixed-wing holdings fell from 23 to 8 and armed helicopters from 47 to 24. ASW capabilities were however doubled, with further increases anticipated.

Air Force

Type	**2000**	**2010**	**Remarks**
Combat Aircraft	88 KF-16C/D *Fighting Falcon* 130 F-4D/E *Phantom*	39 F-15K *Eagle* (20 more on order) 164 KF-16C/D *Fighting Falcon*	Aircraft numbers remained stable but the F-4s were phased out in favor of fourth-generation fighters
Recce Aircraft		4 Hawker 800RA; 20 KO-1	
EW/ELINT		4 Hawker 800SIG	
UAVs	3 *Searchers*	*Night Intruders* 3 *Searcher* 100 *Harpy*	

All figures unless otherwise noted are based primarily on material in International Institute for Strategic Studies, *The Military Balance 2011* (London: Routledge, 2011).

In the wake of the November 2010 Yeonpyeong artillery attack, modernization plans appear to have grown in urgency. Some examples are noted below

- The ROK government sources indicated in January 2011 that they have pushed for expedited purchase of fifth generation stealth fighters by 2015 with a targeted introduction date of 2016-2020. Contenders include the Boeing F-15, Lockheed Martin's F-35 Joint Strike Fighter, and EADS Eurofighters[15]
- Seoul has been lobbying for revisions to a bilateral accord that limits their ballistic missiles to a 300-kilometer range and 500kg payload (See Section 6).
- Growing reports that the ROK is interested in substantially increasing defense-related deals with Israel to buy drones, missiles, radars, and possibly missile defense systems.[16] The most recent was a $29 million deal with Israel's Elbit systems in January 2011 to supply Airborne Electric Warfare (EW) Suites and Missile Warning Systems for the ROKAF CN-235 transport aircraft.[17]
- In end December 2010, the ROK MOD announced it will create a new Joint Forces Command to reform the top military command structure and increase operability between branches.[18]

[15] "South Korea to Speed Up Combat Fighter Purchase," *Reuters*, January 29, 2011. Available at http://www.reuters.com/article/2011/01/30/idINIndia-54508620110130

[16] Amos Harel, "South Korea Eyes Upgrading Israel defense Deals in Light of Tensions with North," *Haaretz*, January 12, 2011. Available at http://www.haaretz.com/print-edition/news/south-korea-eyes-upgrading-israel-defense-deals-in-light-of-tensions-with-north-1.336491

[17] "Elbit Systems to Supply the Republic of Korea Airborne EW Suites and MWS Valued at Approximately $29 Million," *Elbit Systems*, January 11, 2011. Available at http://ir.elbitsystems.com/phoenix.zhtml?c=61849&p=irol-newsArticle&ID=1514783&highlight=

[18] "Military Overhauls Command," *JoongAng Daily*, December 30, 2010. Available at http://joongangdaily.joins.com/article/view.asp?aid=2930299

Figure 1.8: Defense Reform 2020 (2005) Plans for ROK Modernization

Comparison of ROK Army, 2004 Versus 2020

Force Type	2004	2020 Force; Equipment	
		Reduced	Sustained
Army active-duty personnel	560,000	370,000	390,000–400,000?
Forward ground forces			
Top echelons	2 armies, 8 corps	1 command, 6 corps	
Active divisions	5 mechanized, 17 infantry	3 mechanized, 10 motorized	5 mechanized, 8 motorized
Reserve divisions	6 HRDs, 9 MRDs	5 HRDs [+4 MRDs]	
Heavy brigades	4 armor	3 armor, 1 mechanized	
Light brigades	3 infantry	4 security	
Rear ground forces			
Divisions	7 HRDs, 3 MRDs	6 HRDs	
Brigades	3 commandos	1 commando	
Reserve personnel	3,000,000	1,500,000	
Tanks	2,300	1,700	2,300
Armor vehicles	2,400	1,900	2,400
Artillery/multiple rocket launchers	5,300	3,700	5,300
Missiles	30	~50?	
Helos	600	400?	600?

SOURCES: Data are based on (1) information on the DRP provided to the author by the ROK National Assembly; (2) MND, *2004–2005 Defense White Paper,* Seoul, 2005; (3) International Institute for Strategic Studies, *Military Balance 2004–2005,* London; (4) *Jane's World Armies,* Coulsdon, Surrey, U.K.: Jane's Information Group, 2005, http://jwar.janes.com/public/jwar/index.shtml.

NOTES: The author has estimated the character and quantity of 2020 forces where possible. HRD = Homeland Reserve Division.

Bruce Bennett, "A Brief Analysis of the Republic of Korea's Defense Reform Plan," *RAND,* 2006. Available at http://www.rand.org/pubs/occasional_papers/2006/RAND_OP165.pdf

Comparison of ROK Navy and Marine Corps, 2004 Versus 2020

Force Type	2004	2020
Navy/Marine Corps personnel	67,000	64,000
Surface combatants		
Destroyers	3 KDX I, 2 KDX II	3 KDX I, 6 KDX II, 6 KDX III
Frigates	9 Ulsan	17 FFX
Corvette	28	0
Patrol	82	40 PKM-X
Submarines		
KSS-3	0	9?
KSS-2 (Type 214)	0	6
Type 209	9	3
Mini-subs (KSS-1)	11	0
Mine warfare	17	10?
Amphibious ships	4 LSTH, 4 LST	5 LPD, 7? LSTH
Major support ships	6	8?
Aircraft	8 P-3C, 8 S-2A, 5 Caravan	16 P-3C, 5 Caravan
Navy helicopters	30 Lynx	30 Lynx, 8 Mine Hunter, 60 KHP?
Marine divisions	2	2
Marine brigades/regiments	2	0
Tanks	60 K-1	60 K-1A1
Other armor	100	100
Artillery	150	150
Helicopters	6 SA-316	60 KHP?

SOURCES: Data are based on (1) information on the DRP provided to the author by the ROK National Assembly; (2) MND, *2004–2005 Defense White Paper,* Seoul, 2005; (3) International Institute for Strategic Studies, *Military Balance 2004–2005,* London; (4) *Jane's Fighting Ships,* Coulsdon, Surrey, U.K.: Jane's Information Group, 2005, http://jfs.janes.com/public/jfs/index.shtml.

NOTE: The author has estimated the character and quantity of 2020 forces where possible.

Bruce Bennett, "A Brief Analysis of the Republic of Korea's Defense Reform Plan," *RAND*, 2006. Available at http://www.rand.org/pubs/occasional_papers/2006/RAND_OP165.pdf

Comparison of ROK Air Force, 2004 Versus 2020

Force Type	2004	2020
Air force personnel	64,000	65,000
Fighter aircraft	0 high end 150 F-16 380 F-4, F-5, A-37	60 KF-15, 60 KF-X 170 KF-16 130 A-50?
Forward air control	30 O-1, O-2	20 KO-1
Reconnaissance	27 RF-4C, RF-5, Hawker	24 RKF-16, Hawker
Search and rescue	6 CH-47, 3 AS-232	7 Ka-32
AWACS	0	4
Tankers	0	4
Training aircraft	18 Hawk, 30 T-38, 15 T-41, 54 F-5, 25 T-33, 55 KT-1	90 KT-50 80 KT-1
Transport aircraft	2 B-747, 1 B-737, 1 C-118 10 C-130H, 20 CN-235M	3 VIP transports 20 C-130J, 20 CN-235M
Transport helicopters	3 UH-60	?
Unmanned aerial vehicles	3 Searcher, 100 Harpy	More numerous, diverse
Air defenses	200 Nike, 110 I-Hawk	SAM-X, M-SAM

SOURCES: Data are based on (1) information on the DRP provided to the author by the ROK National Assembly; (2) MND, *2004–2005 Defense White Paper,* Seoul, 2005; (3) International Institute for Strategic Studies, *Military Balance 2004–2005,* London; (4) *Jane's Sentinel Security Assessments,* Coulsdon, Surrey, U.K.: Jane's Information Group, 2005, http://sentinel.janes.com/public/sentinel/index.shtml.

NOTES: The author has estimated the character and quantity of 2020 forces where possible. AWACS = Airborne Warning and Control System.

Bruce Bennett, "A Brief Analysis of the Republic of Korea's Defense Reform Plan," *RAND*, 2006. Available at http://www.rand.org/pubs/occasional_papers/2006/RAND_OP165.pdf

Section 2: The Conventional Military Balance in the Koreas and Northeast Asia

There is no one conventional balance that is most likely to shape any conflict between the Koreas, and asymmetric and nuclear forces are likely to play at least some role in the way any conflict develops. The balance of DPRK and ROK "conventional" forces cannot be separated from the role US forces would play in a conflict, from Japan's willingness to support US basing and staging into Korea, and the role China would play in trying to limit any threat to the DPRK as a buffer state.

In broad terms, the ROK has the advantage in conventional force quality and the DPRK has the advantage in force quantity. James R. Clapper, the US Director of National Intelligence ("DNI"), summarized the Korean conventional balance as follows on February 10, 2011:[19]

> North Korea's conventional military capabilities have eroded significantly over the past 10-15 years due to persistent food shortages, poor economic conditions, inability to replace aging weapons inventories, reduced training, and increased diversion of the military to infrastructure support. Therefore, Pyongyang increasingly relies on its nuclear program to deter external attacks on the state and to its regime. Although there are other reasons for the North to pursue its nuclear program, redressing conventional weaknesses is a major factor and one that Kim and his likely successors will not easily dismiss.
>
> Nevertheless, the [Korean People's Army ("KPA") remains a large and formidable force capable of defending the North. Also, as demonstrated by DPRK attacks on the South Korean ship Cheonan in March 2010 and Yeongpyong Island in November, North Korea is capable of conducting military operations that could potentially threaten regional stability. These operations provide Pyongyang with what the regime may see as a means to attain political goals through coercion.

Uncertain Patterns of Conflict and Escalation

There is no reason to assume that any new Korean War would involve the total commitment of the conventional forces on each side, would separate the use of conventional warfare from asymmetric warfare, or could be decoupled from the deterrent and war-limiting impact of the facts that the DPRK has nuclear and chemical weapons, and that both the US and China are major regional nuclear powers.

A war might escalate into a struggle for control of the Korean peninsula, but it is far from clear that this would be the case. Pyongyang might conduct a major conventional build-up to pressure the ROK, Japan, and/or the United States. It might do so to deal with internal unrest by trying to focus the nation on a foreign enemy. It might launch a limited war for the same reasons. Both the DPRK and the ROK would be under at least initial pressure to keep any conflict limited and to find ways to end it, and return to the status before the conflict began.

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[19] James R. Clapper, the US Director of National Intelligence, Annual Threat Assessment of the US Intelligence Community testimony, US Senate Select Committee on Intelligence, February 10, 2011

It is possible that Pyongyang might risk an all-out attack, and some experts have postulated that it might do so if the regime either came under severe internal threat in an effort to unify the DPRK's citizens around a foreign threat, or if Pyongyang felt it was isolated politically and the US and/or ROK might attack.

It seems more likely, however, that the DPRK would use conventional forces to conduct a limited war for limited objectives. It might try to seize islands or part of the DMZ, or to demonstrate its capability to threaten and intimidate the ROK through a limited attack or by launching a major artillery attack across the border on Seoul or some other critical ROK strategic objective. The DPRK might increase the readiness of its conventional forces and/or deploy more conventional forces forward in a battle of intimidation and never go beyond a minor border incident, raid, or use of asymmetric forces in a limited attack somewhere in the ROK or local waters.

It is doubtful that the ROK would initiate a new Korean conventional conflict, but Seoul cannot be sure what level of escalation will follow any response to a limited incident or attacks of the kind the DPRK made on the ROK ship *Cheonan* on March 26, 2010, and on the densely populated ROK island of Yeonpyeong near the countries' western border, which killed four people on November 22, 2010. The ROK might also be confronted with a DPRK succession crisis or massive suppression of the population of the DPRK, creating a strong incentive for some form of decisive ROK military action.

Outside powers would initially play a major role in deterring both sides from an escalation of conventional conflict. The risk of dragging the US and China into a conventional conflict, and the dilemma this would create for Japan, would tend to limit the scope of any given conventional war. At the same time, the DPRK's ideological hostility to the ROK and the US could lead Pyongyang to escalate in ways that are unpredictable and make a "rational bargainer" approach to scenario planning and predicting escalation highly uncertain.

Any major DPRK success on the ground, or escalation of a war, would almost certainly lead the US to escalate its forces and to expand its range of targets in the DPRK. It is possible that Pyongyang might ignore this risk or miscalculate, but it seems unlikely. Similarly, any ROK success that threatened the existence of the DPRK – would confront China with the risk of losing a key buffer state.

China might, or might not, choose to intervene at any stage in such a conflict – either to limit or deter any action against the DPRK or to ensure that ROK and US forces did not "occupy" part of the DPRK. It is at least possible that this escalation could extend to conventional fighting affecting Chinese bases, as well as US bases and carrier task forces, including those as far away as Guam and the "outer island chain" the US might use to base long-range bombers and stealth aircraft. Moreover, China might put pressure on Taiwan as a means of indirectly pressuring the US.

Either side might use strategic air and missile power, and attacks on population centers and critical infrastructure to support tactical operations. In fact, it seems likely that such escalation would occur the moment either side perceived it was threatened with major losses or some form

of defeat. The US also demonstrated during the first and second Gulf Wars in 1991 and 2003, as well as in its attacks on the Republic of Serbia, that strategic air and missile power can play a critical role in limiting an opponent's tactical capability. They can temporarily cripple civilian targets in ways that produce little collateral damage and allow the civil economy to function. Air-land and air-sea operations are now becoming far more complex than in the past, and the dividing lines between tactical attacks and interdiction, and tactical and strategic operations are much less distinct and easy to predict.

The naval dimension of a new Korean War is also unpredictable at virtually every level. The DPRK could use its submarines, smart mines, and longer-range anti-ship missiles in a wide variety of ways, including covert or asymmetric attacks on shipping, and outside Korean waters. It might perceive a naval war, including some kind of attack or seizure of a US ship as a safer way of exerting pressure. China might or might not become involved. Japan would have to decide on its naval posture.

Seen from this perspective, the most important measures in terms of stability may not be arms reductions, or controls on modernization and force change *per se*, but finding ways to limit the risk of confrontation and escalation. Confidence building measures and transparency might do more to limit risk. Expanding limits on deployment in the border area, risk to critical population centers, allowing neutral or mixed observers at exercises, real time transparency on force movements, and mediation of border, air, coastal, and sea control disputes are examples.

Looking at Key Trends

The total strength of each side's conventional forces and their comparative rate of modernization provide a broad picture of their relative war fighting capability. It should be noted, however, that the sources available do not agree on many details, and that an examination of other NGO and commercial data from source such as *Jane's* reveals additional differences. As a result, this section of the analysis presents three main datasets and comparisons based on current capabilities and trends as seen from a Western, ROK, and Japanese perspective.

Western Data from International Institute of Strategic Studies

The data from the International Institute of Strategic Studies present the problem (as do all unclassified sources) in that they cannot reflect the contingency plans of the countries listed. Accordingly they list the total forces of each China, Japan, the DPRK, the ROK, and Taiwan.

As a result, the following comparisons in a following section of this analysis deliberately omit US forces,. US naval and air forces would, however, surge into the Korean theater from outside the area, and the current total of US forces in Japan and the ROK is largely a symbol of such a potential surge. US land forces would be much harder to surge, but would also build-up from outside Japan and the ROK. Much would also depend on Japan's willingness to serve as a staging point, and how much pressure China did or did not put in other areas such as the Pacific and Taiwan Straits.

This is a key problem for arms control. In many ways, the current balance is not the issue. It is the potential balance and role of outside forces in a given contingency. Moreover, limits on forward deployed land forces in the ROK or the Chinese border area in the DPRK would favor

escalation to the use of air and missile power, or key elements of specialized land force reinforcement where quality and specialization would be more important than numbers.

- **Figure 2.1 shows the total manpower on each side.** It is clear that the DPRK and China have much larger manpower totals. The problem, however, is that manpower quality and training—and associated weapons, sustainability, battle management, IS&R, and C4 capability—are likely to be far more important than total active and reserve manpower. Mass is still important, but total manpower no longer is a key measure of force strength.
- **Figure 2.2 shows relative balance of army manpower and land force equipment strength**. Here too, the DPRK and China have a massive lead in force strength. Given the economic disparity between the Koreas, this figure shows that the DPRK is one of the most militarized countries in the world. It has extraordinarily large anti-aircraft holdings, nearly twice the artillery strength of the ROK, as well as a major advantage in self-propelled artillery and a massive lead in multiple rocket launchers (MRLs). The DPRK has a lead in main battle tanks, which is partially offset by an ROK lead in tank quality. (2.2b). It is, however less mechanized than the ROK, and more limited in total armored maneuver strength. (2.2.c), and the ROK at least has parity in rotary wing attack and transport capability because of superior aircraft capability. It should be noted that operations by the forces of each side would be sharply affected by the air-land, surface-to-surface missile battles—areas where the quality of IS&R capability and smart air munitions would have a major impact on the balance.
- **Figure 2.3 shows relative balance of naval manpower and equipment strength**. The DPRK again has a lead over the ROK in manning, but is inferior in virtually every aspect of major naval surface vessel fleet strength and capability. The DPRK, however, has a major lead in amphibious vessels, potential mine layers, and smaller surface vessels of the kind that can be used in asymmetric warfare, and allow it to operate close to shore and outside the normal operating area of major US naval surface vessels. The DPRK also has a major lead in conventional submarines, as does China over Japan. It should be noted that operations by the forces of each side would be sharply affected by the air-sea, smart mine, and anti-ship missile battles—areas where the quality of IS&R capability and smart air munitions would again have a major impact on the balance.
- **Figure 2.4 shows relative balance of air manpower and equipment strength**. The DPRK again has a lead over the ROK in manning, and has one in total aircraft. The DPRK, however, is far inferior in terms of aircraft quality at every level (2.4b and 2.4d), and has a larger and more capable mix of total air, army, and naval attack and combat helicopters (2.4d). The DPRK has 35 MiG-29A/S fighters, and these are the only aircraft approaching a modern type in a force of 620 combat aircraft. The ROK is completing a buildup of 59 F-15K advanced modern fighters and has 164 modern F-16C/Ds. The ROK's 60 AH1F/J attack helicopters are probably superior in individual capability to the DPRK's 20 Mi-24s.
- **Figure 2.5 shows relative balance of surface-to-air air and ballistic missile missile strength**. The trends in missile defense are discussed later in Section Seven. The DPRK has large, but largely obsolete surface-to-air missile defenses. The DPRK also has massive numbers of short-range manportable air defense systems (MANPADs) and anti-aircraft guns. The IISS estimates it has some 3,000 MANPADs and 11,000 guns. The ROK has smaller holdings of surface-to-air missiles, but has far more modern and more capable Hawk and Patriot systems compared to the DPRK's aging SA-2, SA-3, and SA-5 systems. The ROK's qualitative advantage in SAMs would more than offset the DPRK's advantage in numbers. In is unclear how much The DPRK's advantage in AA guns and MANPADs really matters. Most are aging and have limited range and capability. US and ROK strike aircraft have effective countermeasures against most MANPADs and can use air-to-surface missiles from standoff ranges.

It is important to note that these data, and the data on US forces shown in Section 3, can only hint at the qualitative advantages that the ROK side could have when the total associated weapons, sustainability, battle management, IS&R, and C4 capabilities of US and ROK forces are considered, and that this would be particularly true in China stood aside from the conflict. The role of external players is critical in any scenario where they become engaged, and relative force quality could easily be far more decisive than force numbers.

Data from Korean Defense White Papers

The data in recent ROK white papers is shown in **Figures 2.6a to Figure 2.6p**. These data differ strikingly from the IISS data, as well as from the Japanese assessments shown later, and data from sources like Jane's that are not shown in detail in this report.

The manpower data in **Figure 2.6a**, for example, do not agree for any service in either the DPRK or the ROK with the data shown earlier in **Figure 2.1**.

The same is true of the data on army equipment (2.6b), where the ROK shows a much larger DPRK superiority in tanks and other armored vehicles, and uses a very different—but unstated—way of counting artillery. The ROK also presents a very different count of helicopters, and flags a DPRK advantage in river crossing assets ignored in other estimates of the balance.

The ROK data on the naval balance (2.6c) not only show very different numbers for force strength, they make no distinction between the size and capability of naval surface vessels—a count that sharply understates the quality of the ROK fleet.

The ROK data on the air balance are radically less favorable than the IISS data for ROK. The IISS shows a ratio of total DPRK vs. ROK air force combat aircraft of 620 to 467 (1.3x). The ROK white paper for 2010 shows a ratio of total DPRK vs. ROK air force combat aircraft of 820 to 460 (1.8x).

These same differences occur when the comparison is expanded to cover China and Japan. (**Figures 2.6e to 2.6h)**, and are further complicated by the fact that the ROK changes definition from one type of comparison of the same forces to another. There are no consistent patterns in the differences in the estimates for China and Japan, but it should be noted that official US estimates often count the same forces very differently in given commands, services, and branch of the US intelligence community. Much depends on the reason a given comparison is developed, and the definitions used—definitions that often are not explicitly explained in a given source.

Figures 2.6i to 2.6p illustrate another difficulty in making force comparisons. They show the estimates of DPRK forces in different ROK white papers from 2004 to 2010. They do not reveal any major trends in terms of a DPRK build-up, but they do show that the ROK has changed the way it counts DPRK forces over time. Again, a similar comparison of IISS and US official estimates would show the same kinds of differences, and there is no one or right way of counting forces. This does, however, make net assessments much harder to make (and evaluate), and presents obvious problems for any arms control effort that is not either zero-based on hard intelligence data or a negotiated political compromise.

Data from the Japanese White Paper for 2010

The data in the Japanese white paper for 2010 is shown in **Figures 2.7a to Figure 2.7c**. These data seem to be similar to the IISS data, although they differ in detail. They also have the same broad differences from the ROK white papers as the IISS estimates.

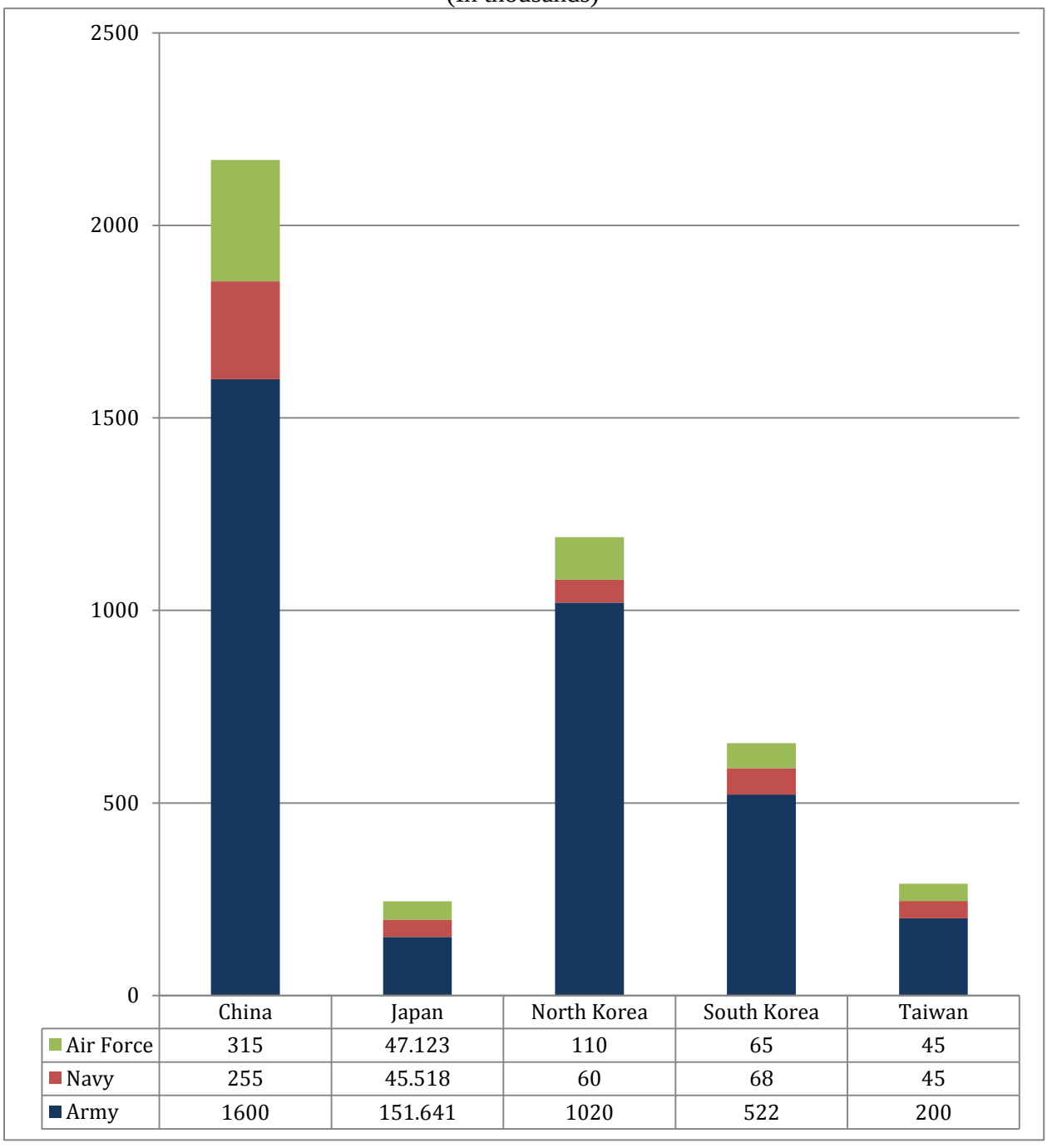
Figure 2.6b does provide new trend data on the size of Japanese Self Defense Forces. These data are useful in showing that Japan is not increasing the size of its forces, or potential threat to China or DPRK—although Japan has made steady improvements in the quality of its forces, its ability to project them, and the quality of its air and missile defense forces.

The Japanese data in **Figures 2.6c and 2.6.d** provide an estimate of the size of Chinese forces and US forces in the ROK. **Figure 2.6.d** provides a useful estimate of how small the US forces in the ROK now are, and shows that they been reduced to a size that is largely demonstrative, if not virtually a trigger force.

International Institute of Strategic Studies Conventional Force Estimates

Figure 2.1: Northeast Asian Military Manpower in 2011

(In thousands)



	China	Japan	North Korea	South Korea	Taiwan
Air Force	315	47.123	110	65	45
Navy	255	45.518	60	68	45
Army	1600	151.641	1020	522	200

International Institute for Strategic Studies, *The Military Balance 2011* (London: Routledge, 2011).

Figure 2.2a: Army Manpower and Equipment in Northeast Asia

Army and Army Reserve Manpower (1,000s)

	China	Japan	DPRK	ROK	Taiwan
Active	1600	151.6	1020	522	200
Reserve	0	46	600	0	1500

Army Equipment

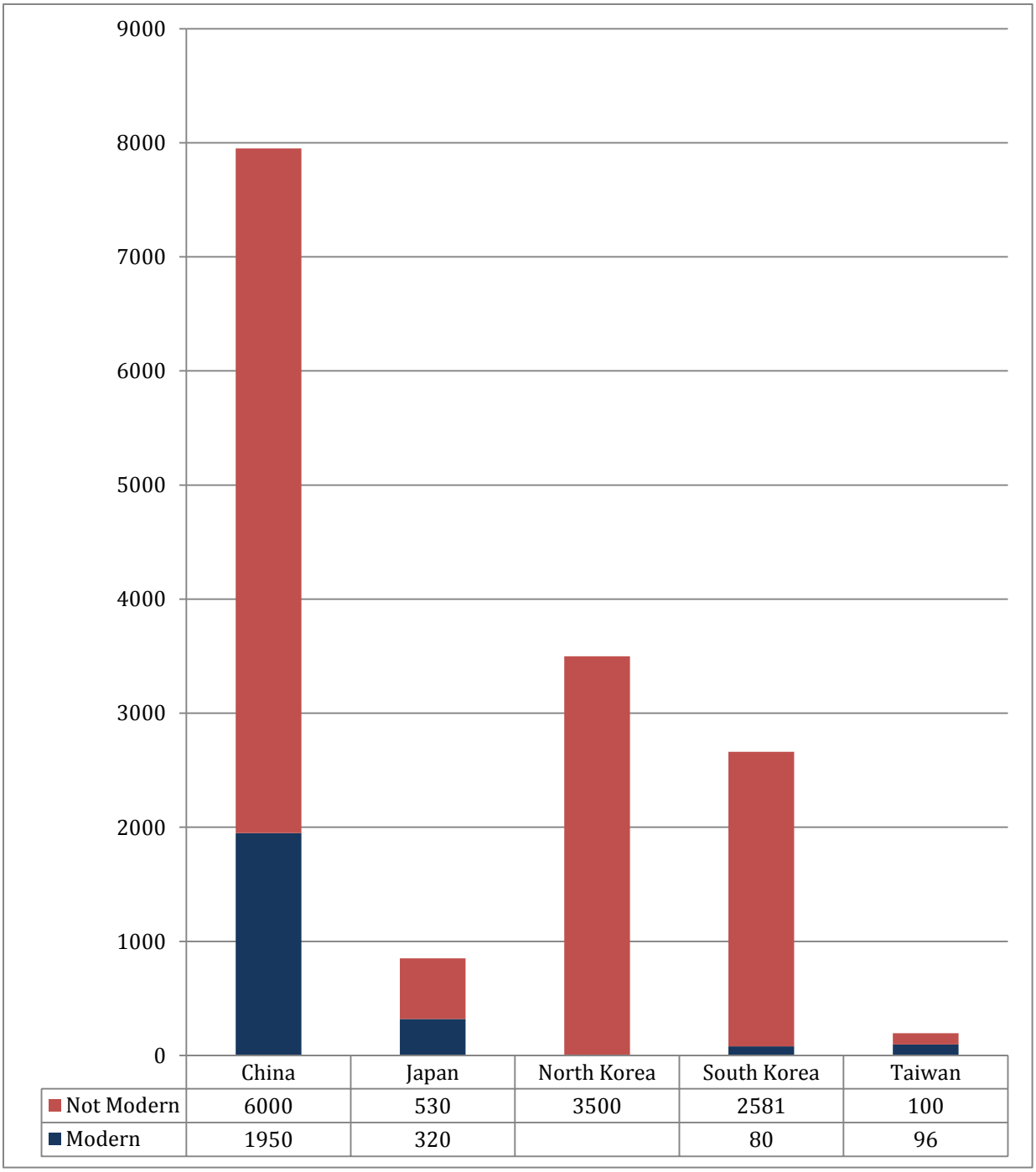
	China	Japan	DPRK	ROK	Taiwan
Air Defense	**7990**	**900**	**11064**	**1498**	**1078**
Air Defense, guns	7700	60	11000	330	400
Air Defense, surface to-air missile	290	740		1138	678
Surface-to-air missile					
Surface-to-surface missile		100	64	30	
Aircraft		**12**		**103**	
Aircraft, transport					
Aircraft, utility		12			
Unmanned Aerial Vehicle				103	
Amphibious				**10**	
Amphibious landing craft				10	
Anti-Tank	**2006**	**3600**	**1700**	**58**	**1060**
Anti-tank, guns	1730			58	
Anti-tank, missile	276	630			1060
Anti-tank, ramped craft logistic		2740	1700		
Anti-tank, rocket launcher		230			
Artillery	**9876**	**1880**	**20500**	**11038**	**1765**
Artillery, multiple rocket launcher	1770	100	5100	1538	705
Artillery, self propelled	1710	210	4400		
Artillery, towed	6246	420	3500	3500	1060
Artillery, gun/mortar					
Artillery, mortar	150	1150	7500	6000	
Helicopter	**507**	**396**		**424**	**220**
Helicopter, assault					
Helicopter, attack	126	111		60	101
Helicopter, search and rescue	15				

Helicopter, special operations				6	
Helicopter, support	278	91		21	9
Helicopter, training		18			30
Helicopter, utility	88	176		337	80
Personnel Carrier	**4540**	**850**	**2500**	**2880**	**1175**
Armored infantry fighting vehicle	1490			100	225
Armored personnel carrier	3050	850	2500	2780	950
Reconnaissance		**100**			
Reconnaissance		100			
Tank	**8750**	**850**	**4060**	**2561**	**1101**
Tank, light	800		560		905
Tank, main battle	7950	850	3500	2561	196

International Institute for Strategic Studies, *The Military Balance 2011* (London: Routledge, 2011)

Figure 2.2b: Northeast Asian Modern Main Battle Tanks versus Total Holdings: 2011

(Number in Active Service)

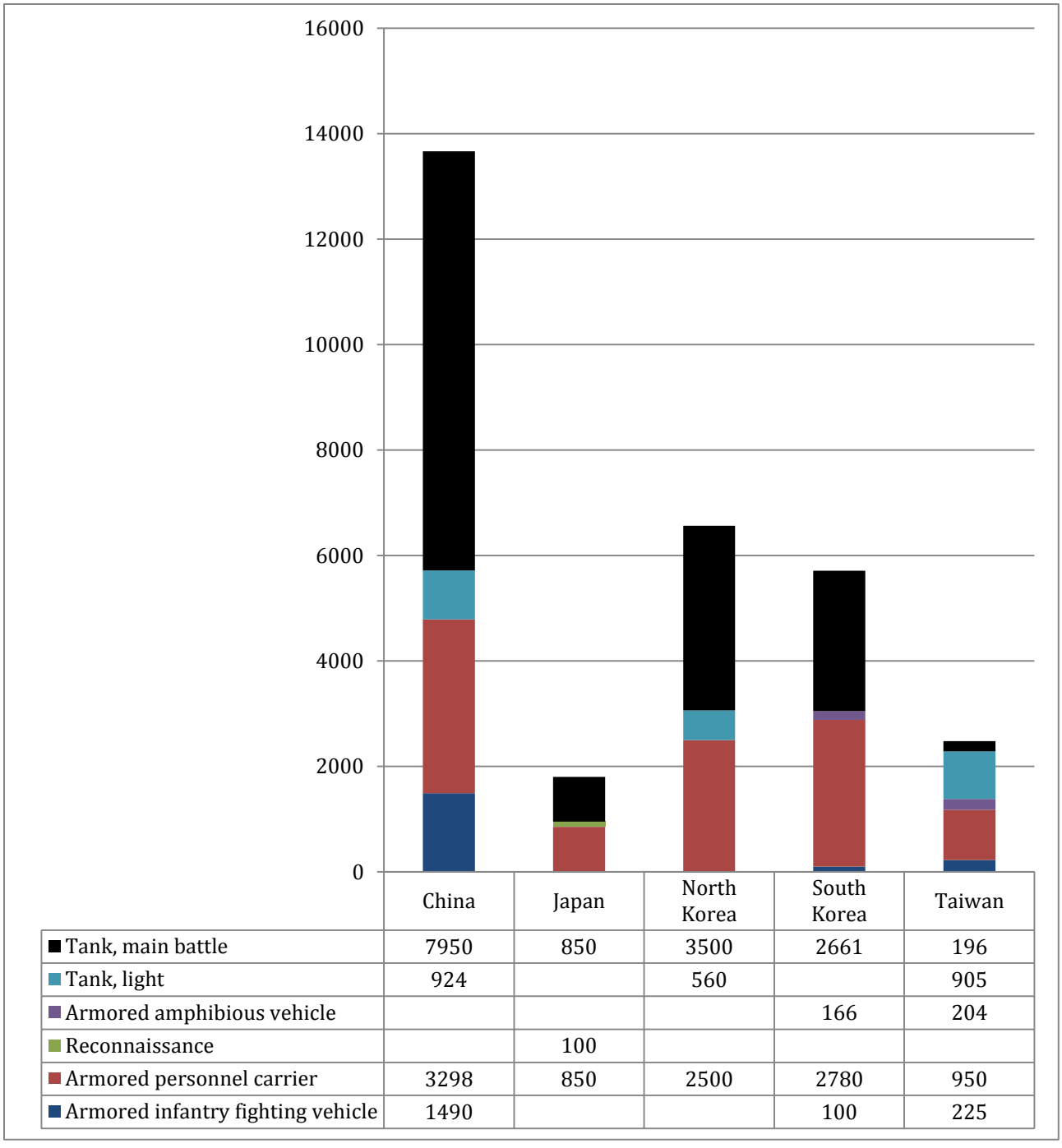


	China	Japan	North Korea	South Korea	Taiwan
Not Modern	6000	530	3500	2581	100
Modern	1950	320		80	96

Based primarily on material in International Institute for Strategic Studies, *The Military Balance 2011* (London: Routledge, 2011). Data includes both Army and Marine inventories. Figures do not include equipment used for training purposes. Some equipment figures are estimates. All equipment figures represent equipment in active service.

Figure 2.2c: Northeast Asian Armored Fighting Vehicles: 2011

(Number of MBTs, AIFVs, AAVs, APCs, RECCE, in active service)

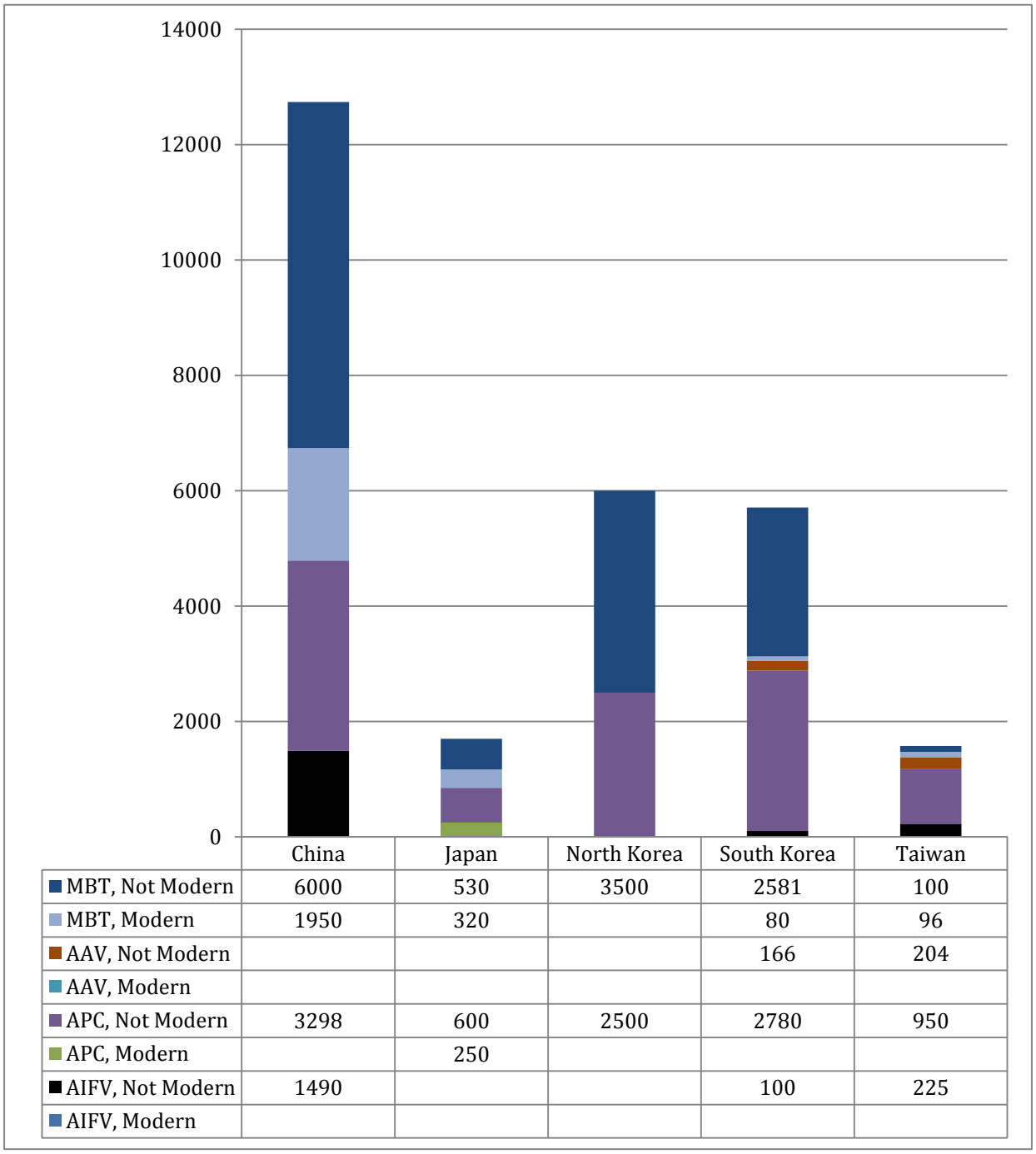


	China	Japan	North Korea	South Korea	Taiwan
Tank, main battle	7950	850	3500	2661	196
Tank, light	924		560		905
Armored amphibious vehicle				166	204
Reconnaissance		100			
Armored personnel carrier	3298	850	2500	2780	950
Armored infantry fighting vehicle	1490			100	225

Based primarily on material in International Institute for Strategic Studies, *The Military Balance 2011* (London: Routledge, 2011). Data includes both Army and Marine inventories. Figures do not include equipment used for training purposes. Some equipment figures are estimates. All equipment figures represent equipment in active service.

Figure 2.2d: Northeast Asian Modern AFVs (MBTs, APCs, AAVs, AIFVs) versus Total Holdings of Other Armored Vehicles: 2011

(Number in active service)

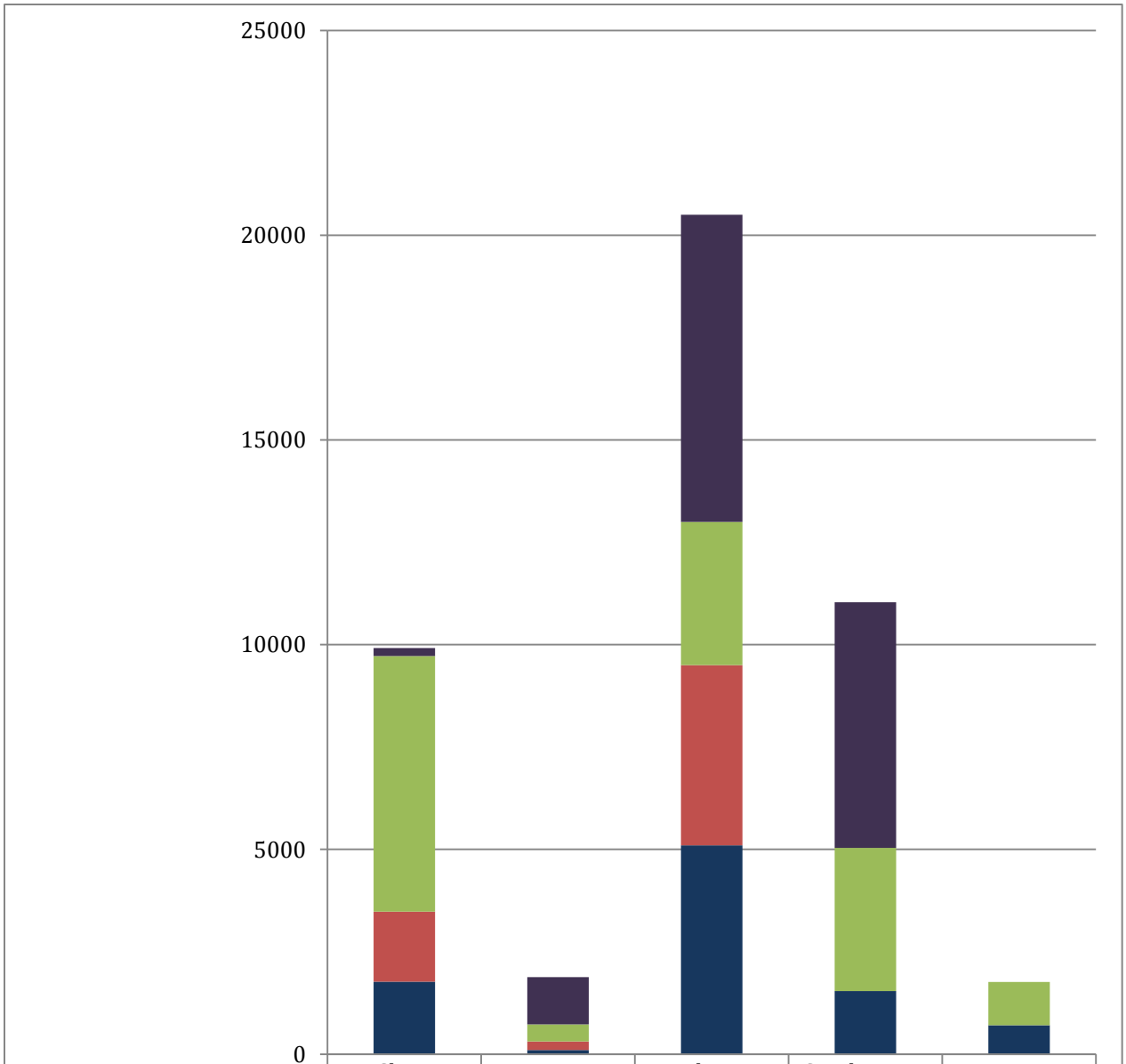


	China	Japan	North Korea	South Korea	Taiwan
MBT, Not Modern	6000	530	3500	2581	100
MBT, Modern	1950	320		80	96
AAV, Not Modern				166	204
AAV, Modern					
APC, Not Modern	3298	600	2500	2780	950
APC, Modern		250			
AIFV, Not Modern	1490			100	225
AIFV, Modern					

Based primarily on material in International Institute for Strategic Studies, *The Military Balance 2011* (London: Routledge, 2011). Data includes both Army and Marine inventories. Figures do not include equipment used for training purposes. Some equipment figures are estimates. All equipment figures represent equipment in active service.

Figure 2.2e: Northeast Asian Artillery Strength: 2011

(Number in active service)



	China	Japan	North Korea	South Korea	Taiwan
Artillery, mortar	190	1150	7500	6000	
Artillery, towed	6246	420	3500	3500	1060
Artillery, self-propelled	1710	210	4400		
Artillery, multiple rocket launcher	1770	100	5100	1538	705

Based primarily on material in International Institute for Strategic Studies, The Military Balance 2011 (London: Routledge, 2011). Data includes both Army and Marine inventories. Figures do not include equipment used for training purposes. Some equipment figures are estimates. All equipment figures represent equipment in active service.

Figure 2.3a: Navy Manpower and Equipment in Northeast Asia

Navy and Navy Reserve Manpower (1,000s; Figures include Naval Aviation and Marines)

	China	Japan	DPRK	ROK	Taiwan
Active	255	42.5	60	68	45
Reserve	0	1.1	0	0	67

Naval Equipment

	China	Japan	North Korea	South Korea	Taiwan
Aircraft	**456**	**179**		**5**	**32**
Aircraft, anti submarine warfare	4	2			32
Aircraft, bomber	50				
Aircraft, fighter	84				
Aircraft, fighter ground attack	138				
Aircraft, maritime patrol	4	93			
Aircraft, reconnaissance	13				
Aircraft, search and rescue		7			
Aircraft, tanker	3				
Aircraft, training	94	63			
Aircraft, transport	66	9		5	
Aircraft, utility		5			
Amphibious	**87**	**5**	**10**	**172**	**219**
Amphibious assault vehicle				166	204
Landing platform, dock				1	
Landing ship, dock					2
Landing ship, medium	61		10		
Landing ship, tank	26	5		5	13
Artillery	**40**				
Artillery, gun/mortar	40				
Command Ships					**1**
Amphibious command					1
Corvettes			**5**	**26**	
Corvette			5	23	

Corvette, with guided missile				3	
Cruiser				**1**	**4**
Cruiser, with guided missile				1	4
Destroyers	**19**	**43**		**6**	
Destroyer		4			
Destroyer, with guided missile	19	39		6	
Frigates	**52**	**6**	**3**	**12**	**22**
Frigate			3		
Frigate, with guided missile	52	6		12	22
Helicopter	**71**	**135**		**29**	**20**
Helicopter, anti submarine warfare	38	92		24	20
Helicopter, mine countermeasures		9			
Helicopter, search and rescue	25	18			
Helicopter, support	8	4			
Helicopter, training		8			
Helicopter, utility		4		5	
Helicopter, transport		6			
Landing Craft	**151**	**20**	**257**	**31**	**288**
Air cushion vehicle		6			
Amphibious landing craft	11			5	
Landing craft, medium	20	12	25		170
Landing craft, tank				6	
Landing craft, utility	120	2			18
Landing craft, vehicles and personnel			136	20	100
Landing craft, personnel, light			96		
Logistics and Support	**205**	**75**	**23**	**22**	**13**
Air-to-ground missile	5				
Anti-submarine	8	1	8		
Auxiliary fuel and aummunition, with Replenishment at Sea capability		5			1
Cargo ship	23				3

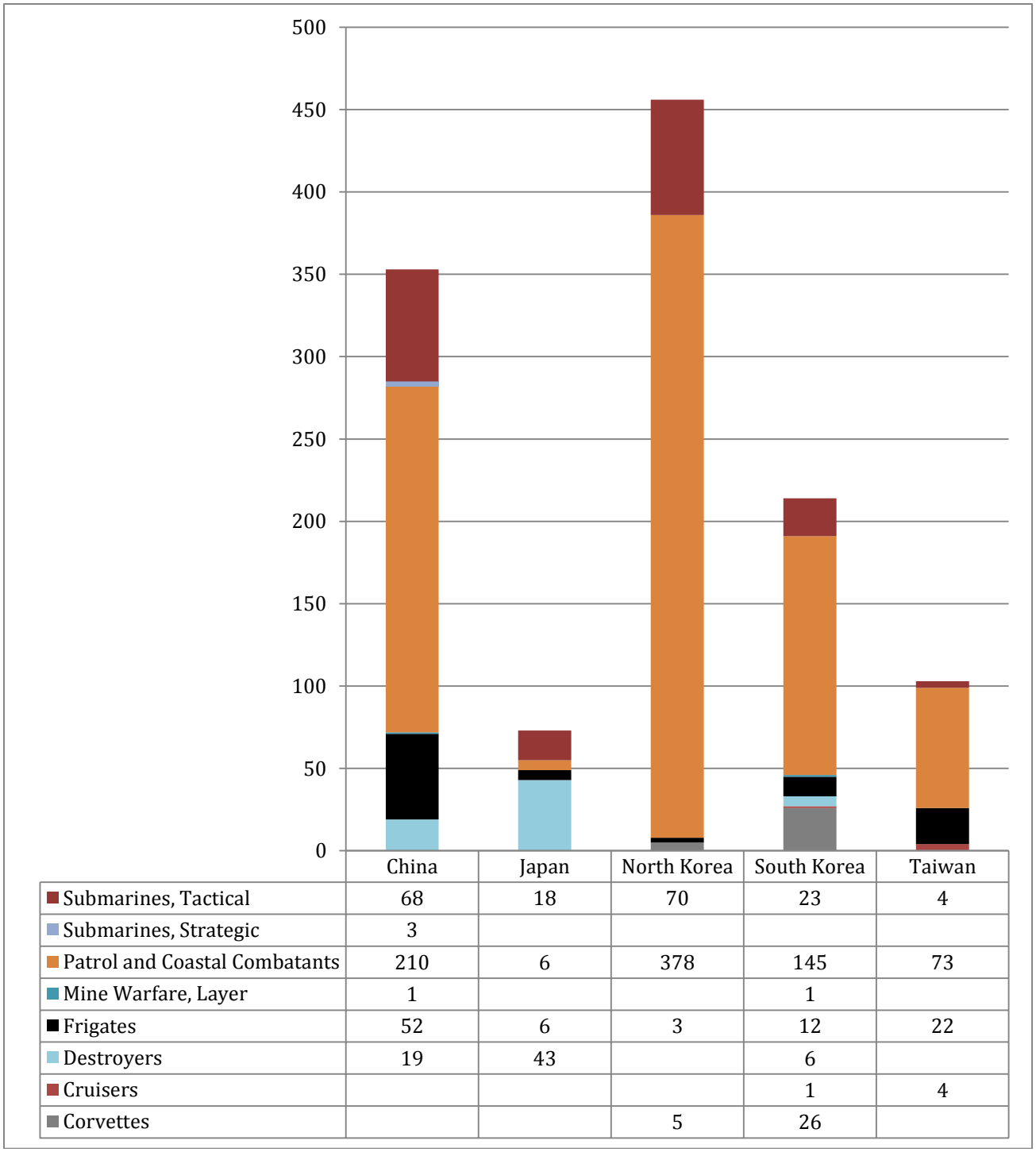
Degaussing	5				
Diving tender		6			
Hospital ship	1				
Icebreaker	4	1			
Intelligence collection vessel	1		14		
Medium harbor tug		20			
Miscellaneous auxiliary	6	2		1	1
Oceanographic research vessel	5			17	1
Repair ship		1		1	6
Replenishment oiler light	5				
Salvage ship	2				
Sea-going buoy tender	7				
Submarine rescue craft	1	1	1		
Support		5			
Survey ship	6	4			1
Tanker	50				
Tanker, with hel capacity	5			3	
Training	2	6			
Tug, ocean going	51	22			
Water tanker	18				
Yacht		1			
Mine Warfare, Counter	**85**	**31**	**24**	**9**	**12**
Mine countermeasures, support		4			
Mine countermeasures, vessel	7				
Mine hunter, coastal			24	6	
Mine sweeper, coastal	16				8
Mine sweeper, drone	46				
Mine sweeper, ocean	16	27		3	4
Mine Warfare, Layer	**1**			**1**	
Mine layer	1			1	
Missile	**72**				
Missile, Coastal Defense	72				

Patrol and Coastal Combatants	**210**	**6**	**378**	**145**	**73**
Fast patrol craft with SSM		6			
Patrol craft	101				
Patrol craft offshore				7	
Patrol craft, coastal	75		18	32	
Patrol boat	34		342	106	12
Patrol craft,			18		61
Personnel Carrier	**248**				
Armored personnel carrier	248				
Submarines, Strategic	**3**				
Ballistic missile, nuclear fuelled	3				
Submarines, Tactical	**68**	**18**	**70**	**23**	**4**
Attack, diesel, non ballistic missile launchers	1				
Attack, nuclear powered	6				
Submarine, diesel	1				
Submarine, diesel, coastal			28		
Submarine, diesel, inshore				11	
Submarine, diesel, ASW capability	60	18	22	12	4
Submarine			20		
Tank	**124**			**100**	
Tank, light	124				
Tank, main battle				100	

International Institute for Strategic Studies, *The Military Balance 2011* (London: Routledge, 2011).

Figure 2.3b: Northeast Asian Naval Combat Ships: 2011

(Number in active service)

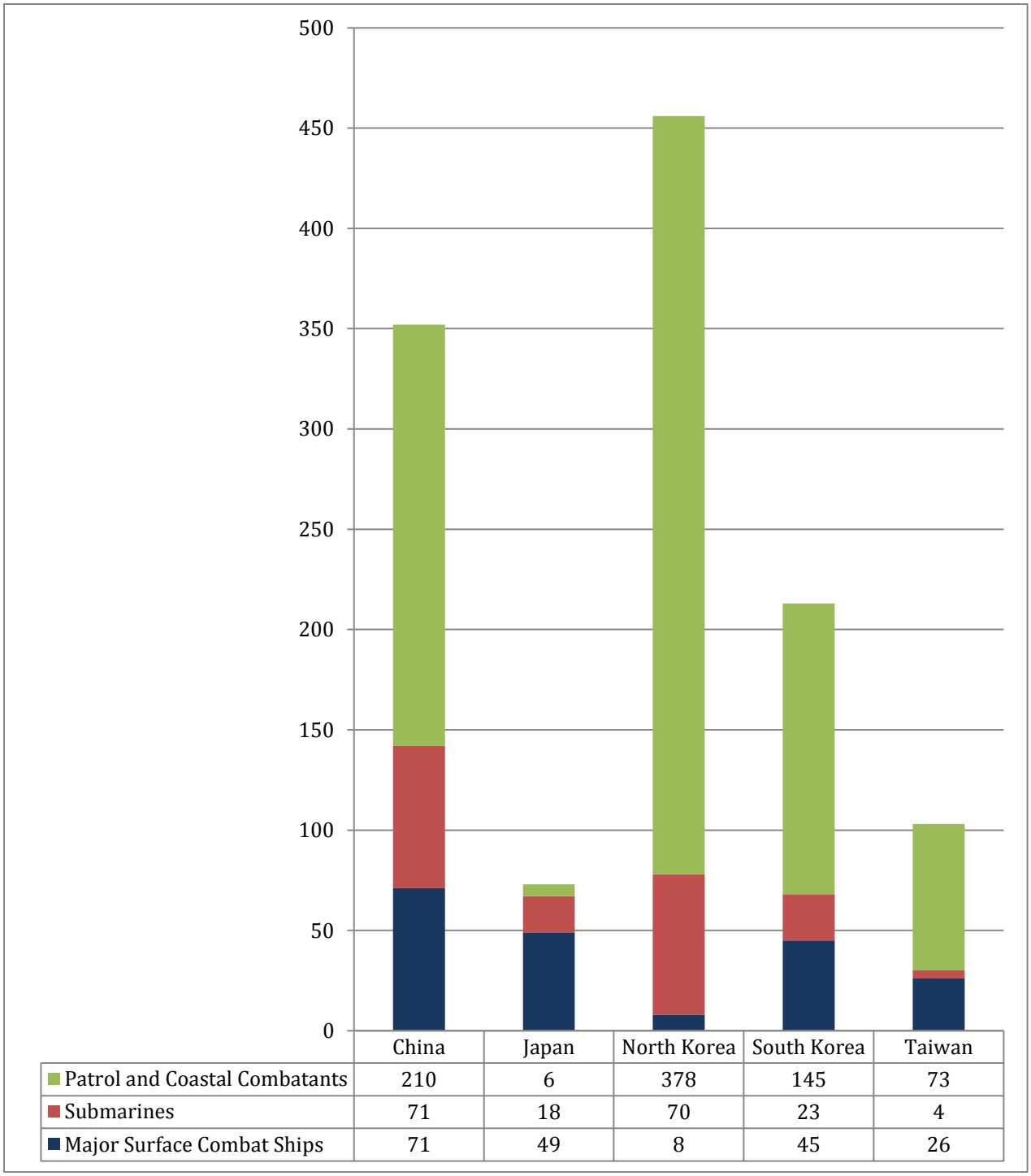


	China	Japan	North Korea	South Korea	Taiwan
Submarines, Tactical	68	18	70	23	4
Submarines, Strategic	3				
Patrol and Coastal Combatants	210	6	378	145	73
Mine Warfare, Layer	1			1	
Frigates	52	6	3	12	22
Destroyers	19	43		6	
Cruisers				1	4
Corvettes			5	26	

Based primarily on material in International Institute for Strategic Studies, *The Military Balance 2011* (London: Routledge, 2011). Data for patrol crafts includes standard, fast and hydrofoil patrol craft types. Figures do not include equipment used for training purposes. Some equipment figures are estimates. All equipment figures represent equipment in active service.

Figure 2.3c: Northeast Asian Naval Combat Ships by Category: 2011

(Number in active service)

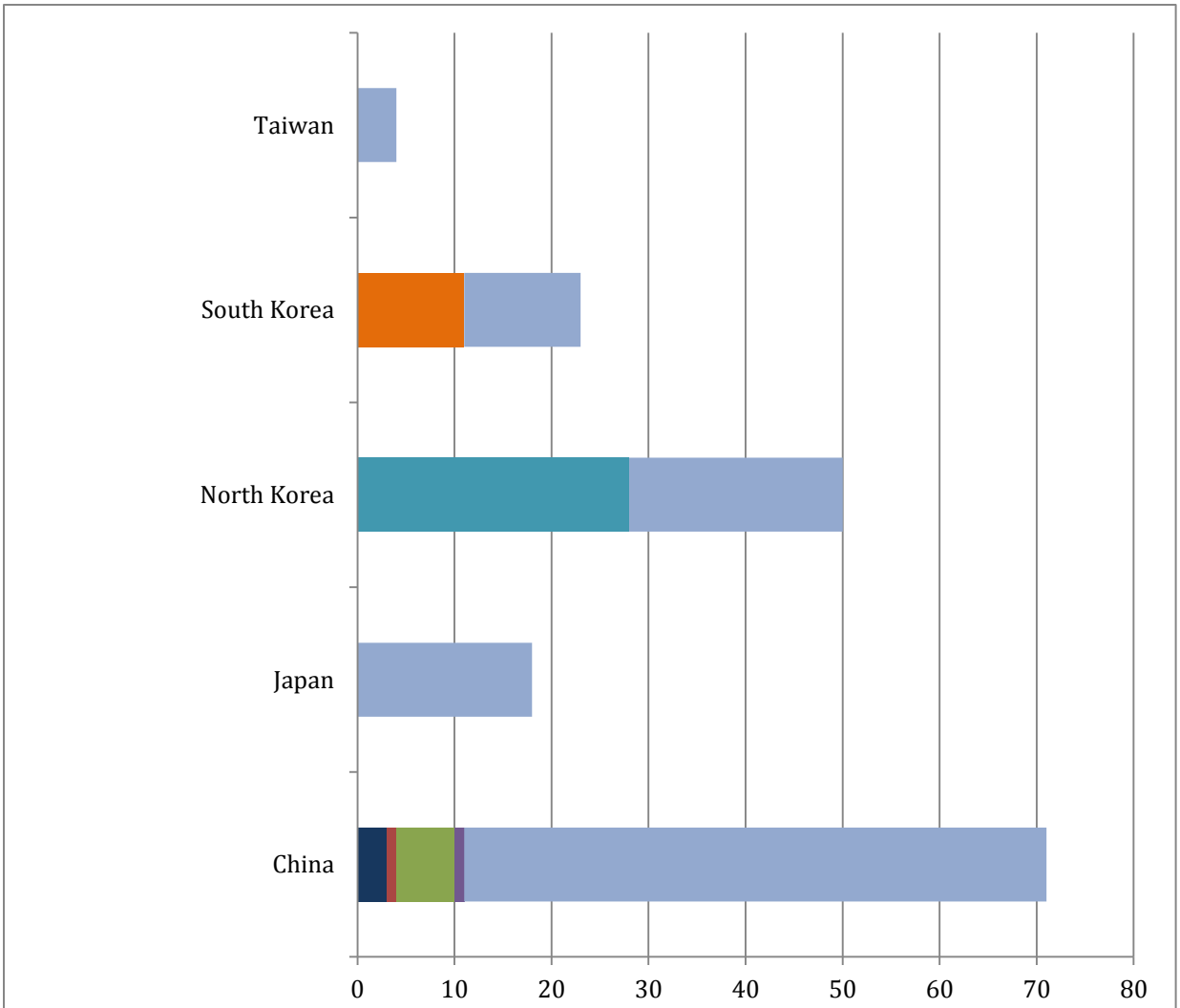


	China	Japan	North Korea	South Korea	Taiwan
Patrol and Coastal Combatants	210	6	378	145	73
Submarines	71	18	70	23	4
Major Surface Combat Ships	71	49	8	45	26

Based primarily on material in International Institute for Strategic Studies, *The Military Balance 2011* (London: Routledge, 2011).

Figure 2.3d: Northeast Asian Submarines by Type: 2011

(Number in active service)



	China	Japan	North Korea	South Korea	Taiwan
Ballistic-, nuclear-fuelled	3				
Attack, diesel, non-ballistic	1				
Attack, nuclear-powered	6				
Diesel	1				
Diesel, coastal			28		
Diesel, inshore				11	
Diesel, ASW capability	60	18	22	12	4

Based primarily on material in International Institute for Strategic Studies, *The Military Balance 2011* (London: Routledge, 2011). Figures do not include equipment used for training purposes. Some equipment figures are estimates. All equipment figures represent equipment in active service.

Figure 2.4a: Air Force Manpower and Equipment in Northeast Asia

Air Force and Air Force Reserve Manpower (1,000s)

	China	Japan	DPRK	ROK	Taiwan
Active	315	47.12	110	65	45
Reserve	0	0.8	0	0	90

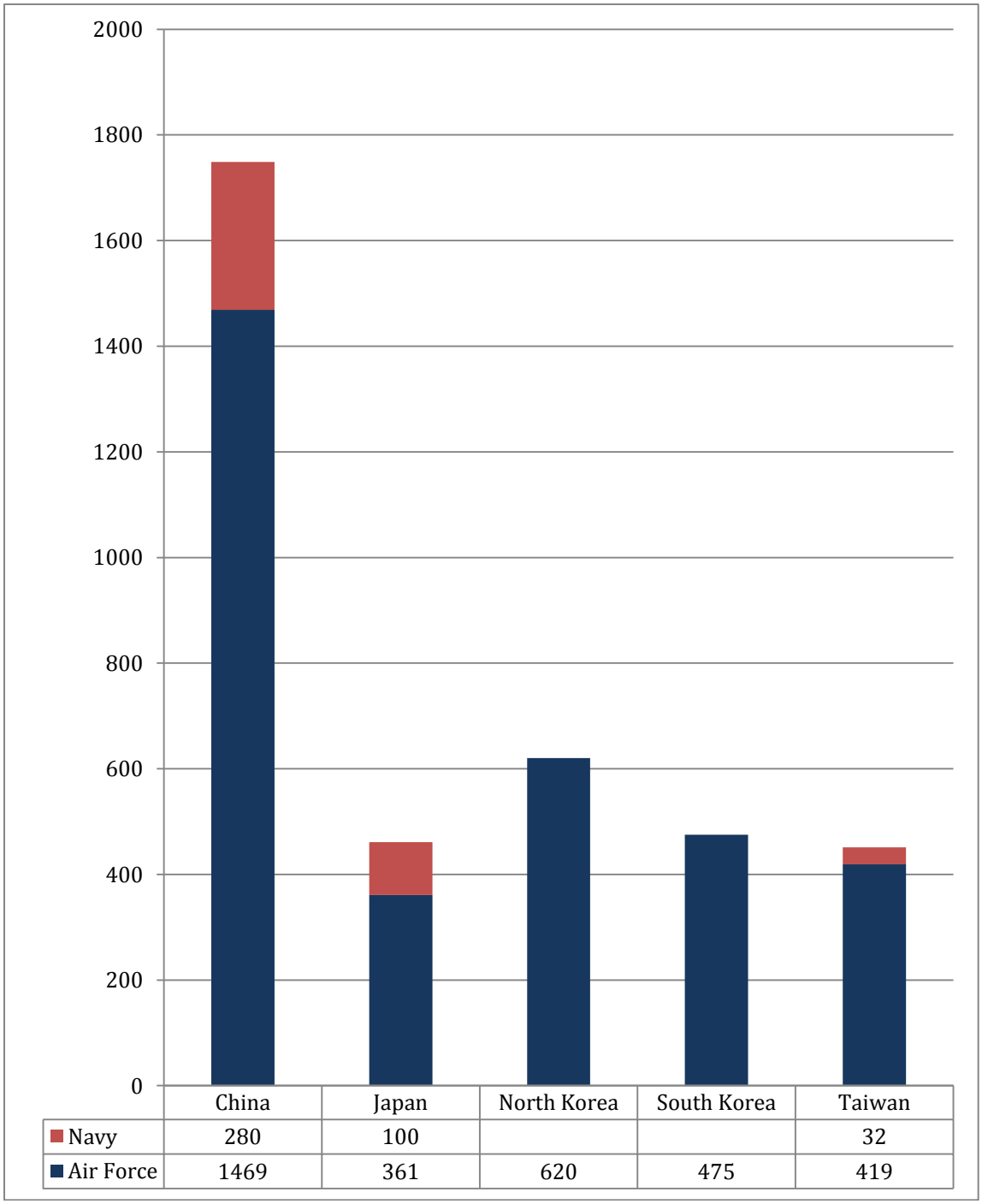
Air Force Equipment

	China	Japan	North Korea	South Korea	Taiwan
Air Defense	**16600**	**208**	**3400**		
Air Defense, guns	16000				
Air Defense, man portable			3050		
Air defense, static			38		
Surface-to-air missile	600	208	312		
Aircraft	**2454**	**740**	**852**	**708**	**574**
Aircraft, airborne early warning	8	17			6
Aircraft, bomber	82		80		
Electronic warfare	10	11		4	2
Aircraft, fighter	1055	361	488	467	291
Aircraft, fighter ground attack	332		52		128
Maritime patrol				8	
Aircraft, recon	96	13		46	8
Search and rescue		26			
Aircraft, surveillance	3				
Aircraft, tanker	10	4			
Aircraft, training	522	261	215	150	100
Aircraft, transport	336	42	17	33	39
Aircraft, utility		5			
Helicopter	**80**	**53**	**302**	**56**	**35**
Helicopter, attack			20		
Helicopter, search and rescue		38			
Helicopter, support	56	15	202	8	34
Helicopter, utility	24		80	48	1
Missile	**4500**				
Missile, tactical	4500				

Source: International Institute for Strategic Studies, *The Military Balance 2011* (London: Routledge, 2011)

Figure 2.4b: Northeast Asian Fixed Wing Combat Aircraft by Branch: 2011

(Number in active service)

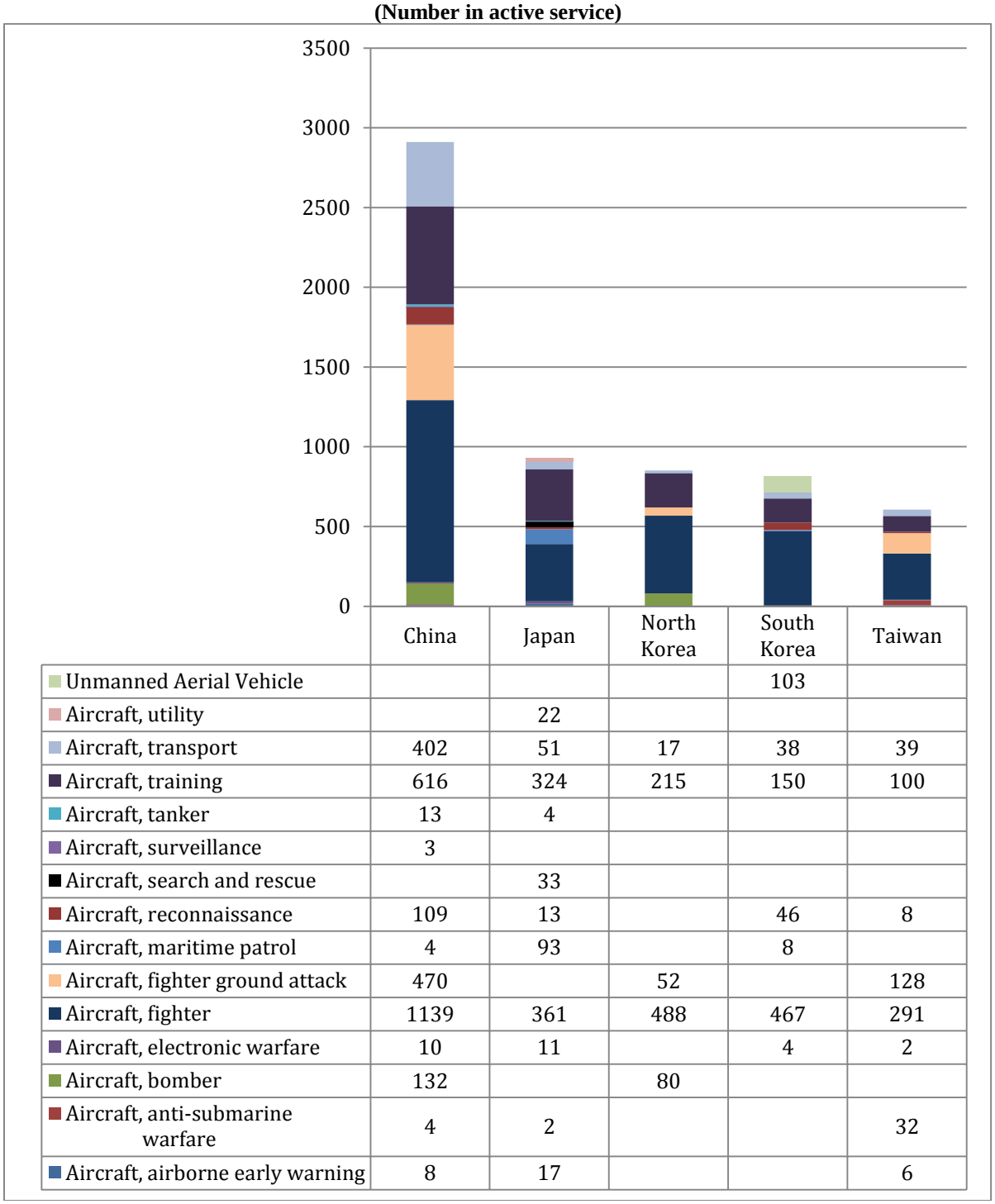


	China	Japan	North Korea	South Korea	Taiwan
Navy	280	100			32
Air Force	1469	361	620	475	419

Based primarily on material in International Institute for Strategic Studies, *The Military Balance 2011* (London: Routledge, 2011). Figures do not include equipment used for training purposes. Some equipment figures are estimates. All equipment figures represent equipment in active service.

Figure 2.4c: Northeast Asian Fixed Wing Combat Aircraft by Type: 2011

(Number in active service)

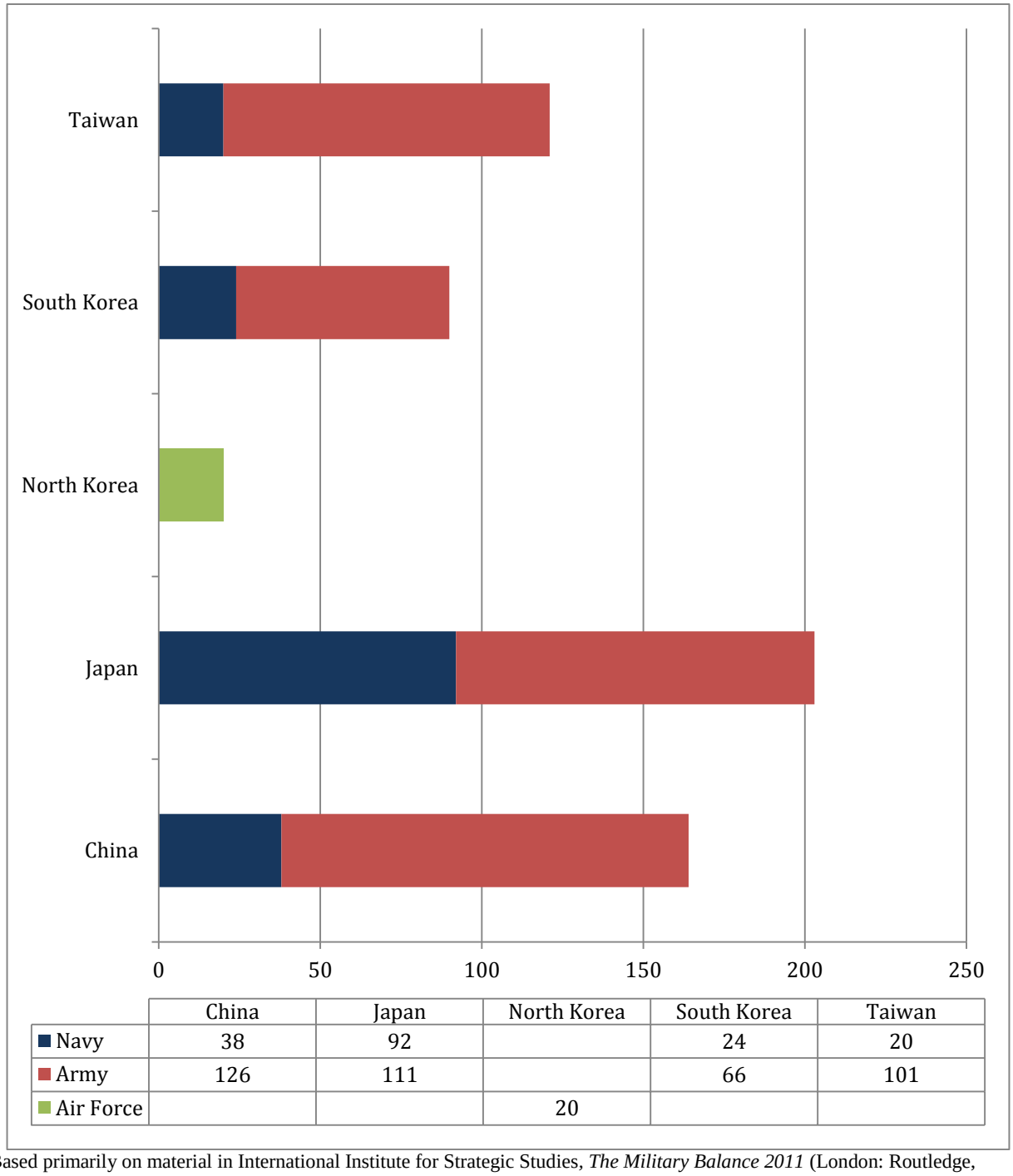


	China	Japan	North Korea	South Korea	Taiwan
Unmanned Aerial Vehicle				103	
Aircraft, utility		22			
Aircraft, transport	402	51	17	38	39
Aircraft, training	616	324	215	150	100
Aircraft, tanker	13	4			
Aircraft, surveillance	3				
Aircraft, search and rescue		33			
Aircraft, reconnaissance	109	13		46	8
Aircraft, maritime patrol	4	93		8	
Aircraft, fighter ground attack	470		52		128
Aircraft, fighter	1139	361	488	467	291
Aircraft, electronic warfare	10	11		4	2
Aircraft, bomber	132		80		
Aircraft, anti-submarine warfare	4	2			32
Aircraft, airborne early warning	8	17			6

Based primarily on material in International Institute for Strategic Studies, *The Military Balance 2011* (London: Routledge, 2011). Data for each aircraft type represent the sum of all active service aircraft in Army, Navy and Air Force inventories. Figures do not include equipment used for training purposes. Some equipment figures are estimates. All equipment figures represent equipment in active service.

Figure 2.4d: Northeast Asian Rotary Wing Combat Aircraft by Branch: 2011

(Number in active service)

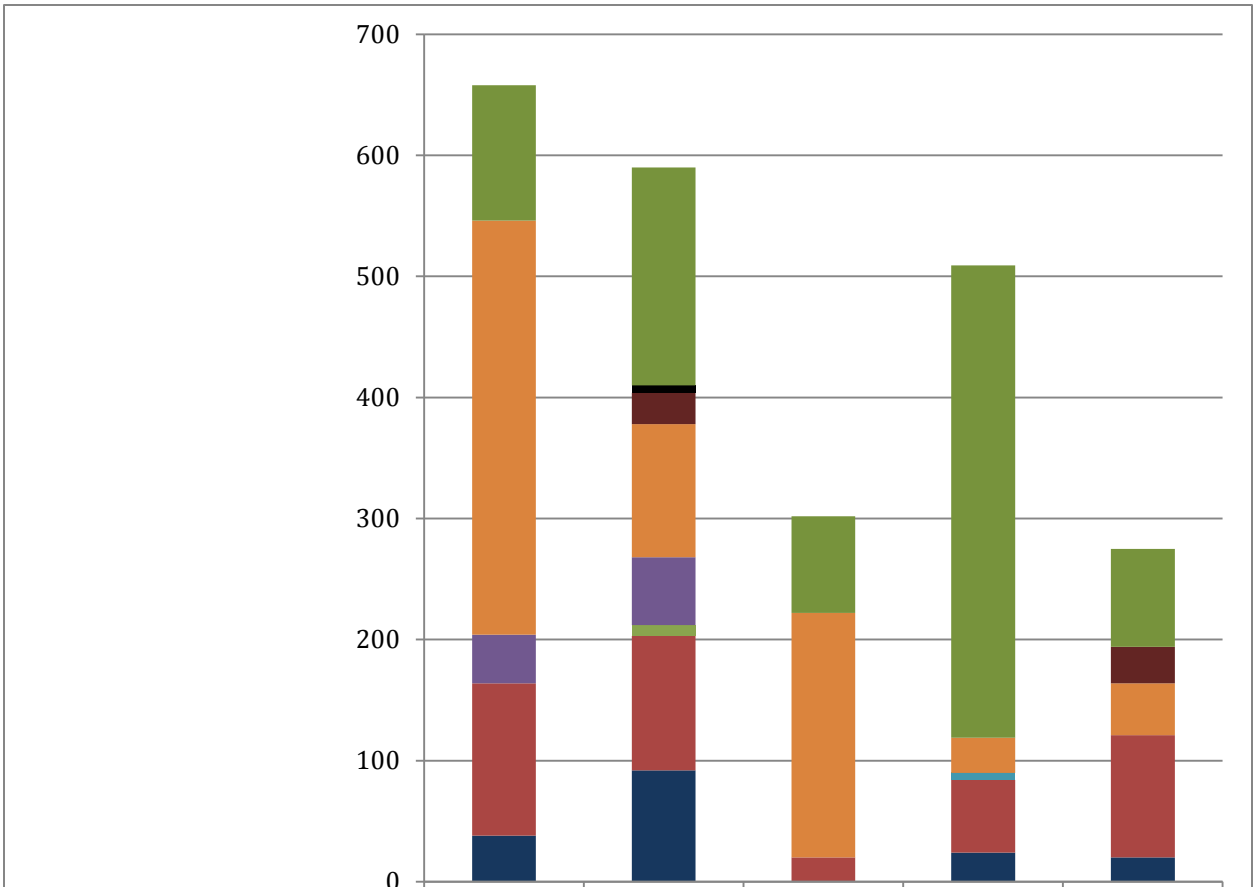


	China	Japan	North Korea	South Korea	Taiwan
Navy	38	92		24	20
Army	126	111		66	101
Air Force			20		

Based primarily on material in International Institute for Strategic Studies, *The Military Balance 2011* (London: Routledge, 2011). Figures do not include equipment used for training purposes. Some equipment figures are estimates. All equipment figures represent equipment in active service. "Combat" defined as platforms designed specifically for the purpose of offensive combat operations.

Figure 2.4e: Northeast Asian Rotary Wing Aircraft by Type: 2011

(Number in active service)

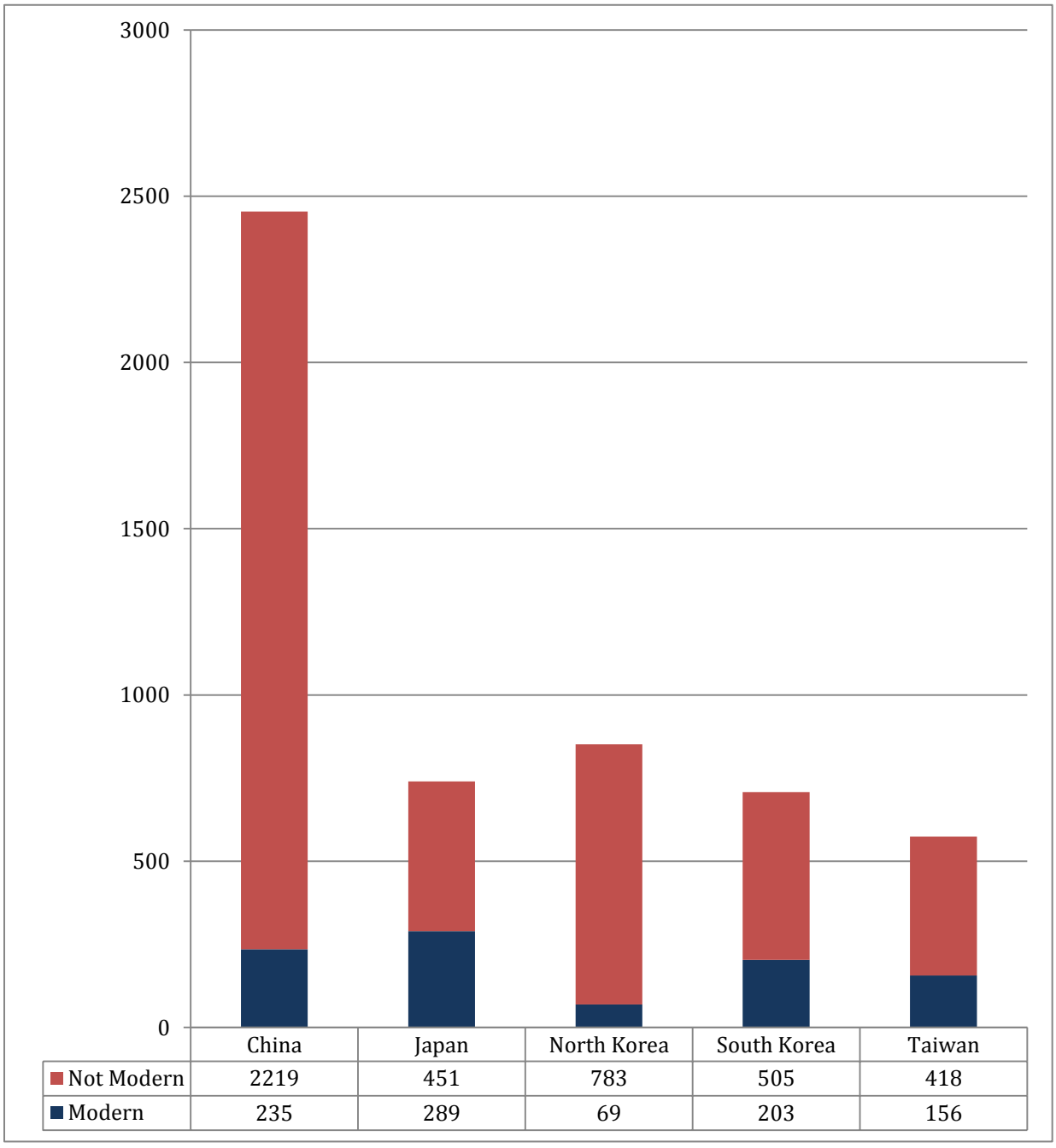


	China	Japan	North Korea	South Korea	Taiwan
Helicopter, utility	112	180	80	390	81
Helicopter, transport		6			
Helicopter, training		26			30
Helicopter, support	342	110	202	29	43
Helicopter, special operations				6	
Helicopter, search and rescue	40	56			
Helicopter, mine countermeasures		9			
Helicopter, attack	126	111	20	60	101
Helicopter, anti-submarine warfare	38	92		24	20

Based primarily on material in International Institute for Strategic Studies, *The Military Balance 2011* (London: Routledge, 2011). Data for each aircraft type represent the sum of all active service aircraft in Army, Navy and Air Force inventories. Figures do not include equipment used for training purposes. Some equipment figures are estimates. All equipment figures represent equipment in active service.

Figure 2.4f: Northeast Asian Modern Air Force Combat Aircraft versus Total Combat Aircraft: 2011

(Number in active service)



Based primarily on material in International Institute for Strategic Studies, *The Military Balance 2011* (London: Routledge, 2011). Data for each aircraft type represent the sum of all active service aircraft in Army, Navy and Air Force inventories. Figures do not include equipment used for training purposes. Some equipment figures are estimates. All equipment figures represent equipment in active service

Figure 2.5a: Korean and Northeast Asian Air/Missile Defenses

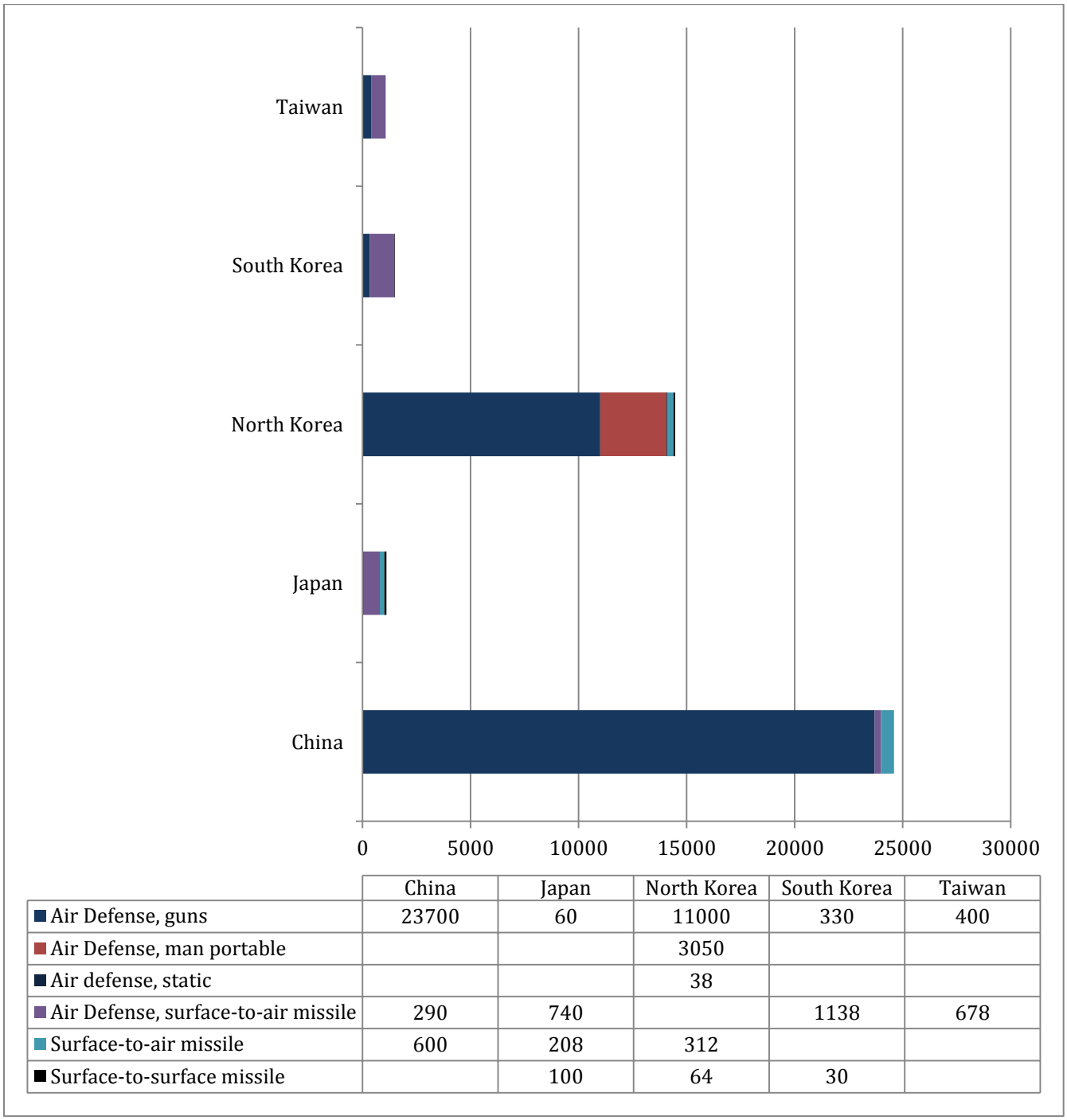
Country	Major SAMs	Light SAMs
DPRK	38 SA-5 *Gammon* 179+ SA-2 *Guideline* 133 SA-3 *Goa*	13,050 SA-16/SA-7/SA-14
ROK	*Chun Ma Pegasus* 158 MIM-23B *I-HAWK* 48 *Patriot**	60 FIM-43 *Redeye* 200 FIM-92A *Stinger* 350 *Javelin* 170 *Mistral* SA-16 *Gimlet*
China	200 HQ-7A 60 SA-15 *Gauntlet (Tor M1)* 30 HQ-6D *Red Leader* 24 HD-6D 60+ HQ-7 32 HQ-9 24 HQ-12 (KS-1A) 32 S-300PMU (SA-10B)* 64 S-300PMU-1 (SA-10C) *Grumble** 64 S-300PMU-2 (SA-10C*) Grumble** 300+ HQ-2/HQ-2A/HQ-2B(A) (SA-2) *Guideline*	HN-5A/HN-5B *Hong Nu* FN-6/QW-1/QW-2
Japan	60+ Type-81 *Tan-SAM* 180 MTM-23B *I-HAWK* 10 Type-03 *Chu-Sam* 110 Type-93 *Kin SAM* 192+ MIM-104 *Patriot** 16+ PAC-3 *Patriot* (system)*	*50+* FIM-92A *Stinger* *330+* Type-91 *Kin-SAM/Kei SAM*
Taiwan	74 FIM-92A *Avenger* 2 M-48 *Chaparral* 25 MIM-104 *Patriot** 100 MIM-23 *HAWK* 6 PAC-3 *Patriot* (system)* 6 Tien Kung I *Sky Bow*/Tien Kung II *Sky Bow*	465+ FIM-92A *Stinger*

Note: * indicates ABM (anti-ballistic missile) capability

Based primarily on material in International Institute for Strategic Studies, *The Military Balance 2010* (London: Routledge, 2010).
Figures represent equipment in use across service branches. All equipment figures represent equipment in active service.

Based primarily on material in International Institute for Strategic Studies, *The Military Balance 2010* (London: Routledge, 2010).
Figures represent equipment in use across service branches. All equipment figures represent equipment in active service.

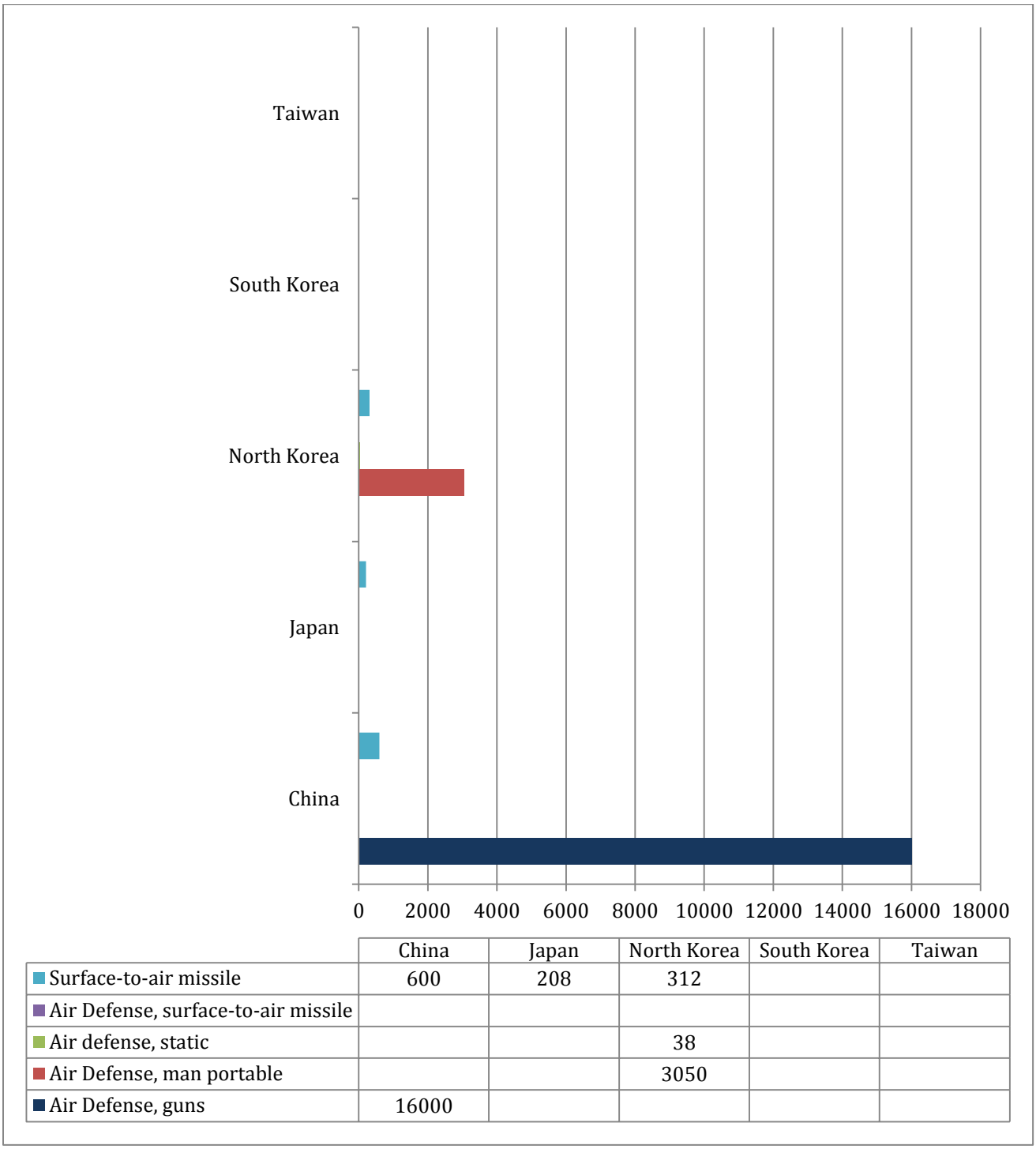
Figure 2.5b: Korean and Northeast Asian Air/Missile Defenses 2011



	China	Japan	North Korea	South Korea	Taiwan
Air Defense, guns	23700	60	11000	330	400
Air Defense, man portable			3050		
Air defense, static			38		
Air Defense, surface-to-air missile	290	740		1138	678
Surface-to-air missile	600	208	312		
Surface-to-surface missile		100	64	30	

Based primarily on material in International Institute for Strategic Studies, *The Military Balance 2011* (London: Routledge, 2011). Data includes both Army and Marine inventories. Figures do not include equipment used for training purposes. Some equipment figures are estimates. All equipment figures represent equipment in active service.

Figure 2.5c: Northeast Asian Air Force Air Defenses: 2010

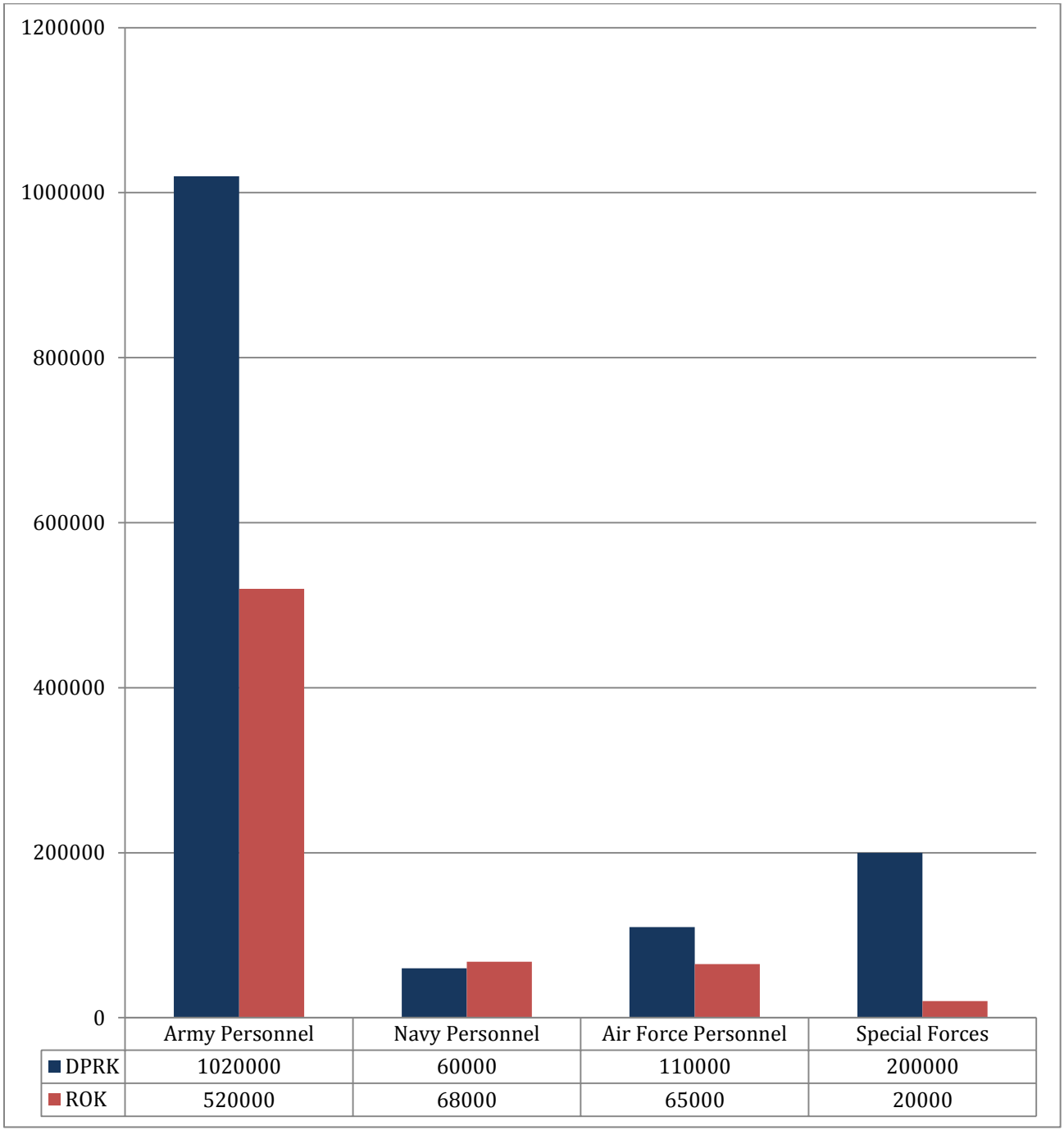


	China	Japan	North Korea	South Korea	Taiwan
Surface-to-air missile	600	208	312		
Air Defense, surface-to-air missile					
Air defense, static			38		
Air Defense, man portable			3050		
Air Defense, guns	16000				

Based primarily on material in International Institute for Strategic Studies, *The Military Balance 2010* (London: Routledge, 2010). Data for each aircraft type represent the sum of all active service aircraft in Army, Navy and Air Force inventories. Figures do not include equipment used for training purposes. Some equipment figures are estimates. All equipment figures represent equipment in active service.

Republic of Korea (ROK) Conventional Force Estimates

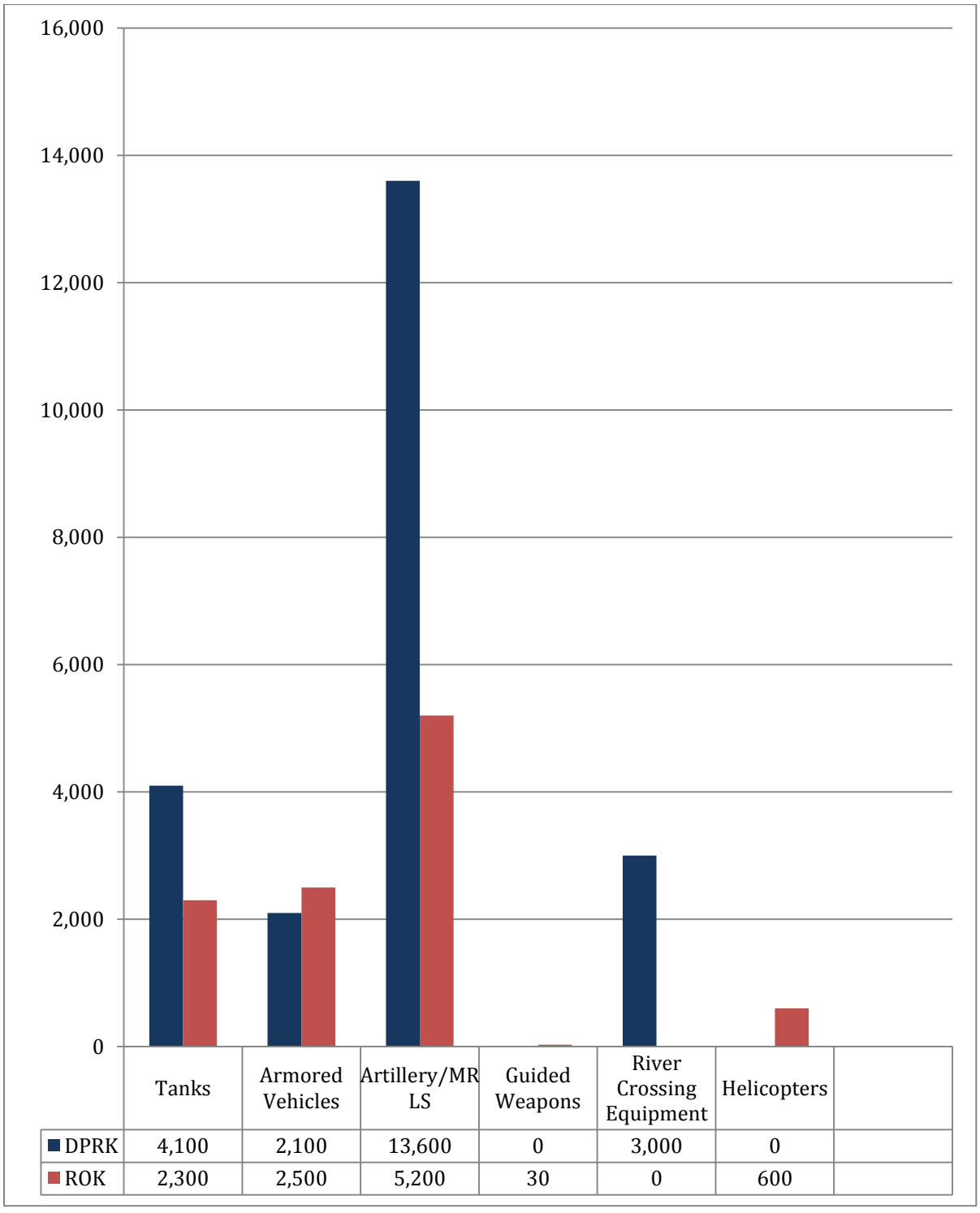
Figure 2.6a: ROK Estimate of Korean Force Balance in 2010: Manpower



	Army Personnel	Navy Personnel	Air Force Personnel	Special Forces
DPRK	1020000	60000	110000	200000
ROK	520000	68000	65000	20000

Based primarily on material provided from Republic of Korea Ministry of Defense, *Defense White Paper 2010.* Some equipment figures are estimates. All equipment figures represent equipment in active service.

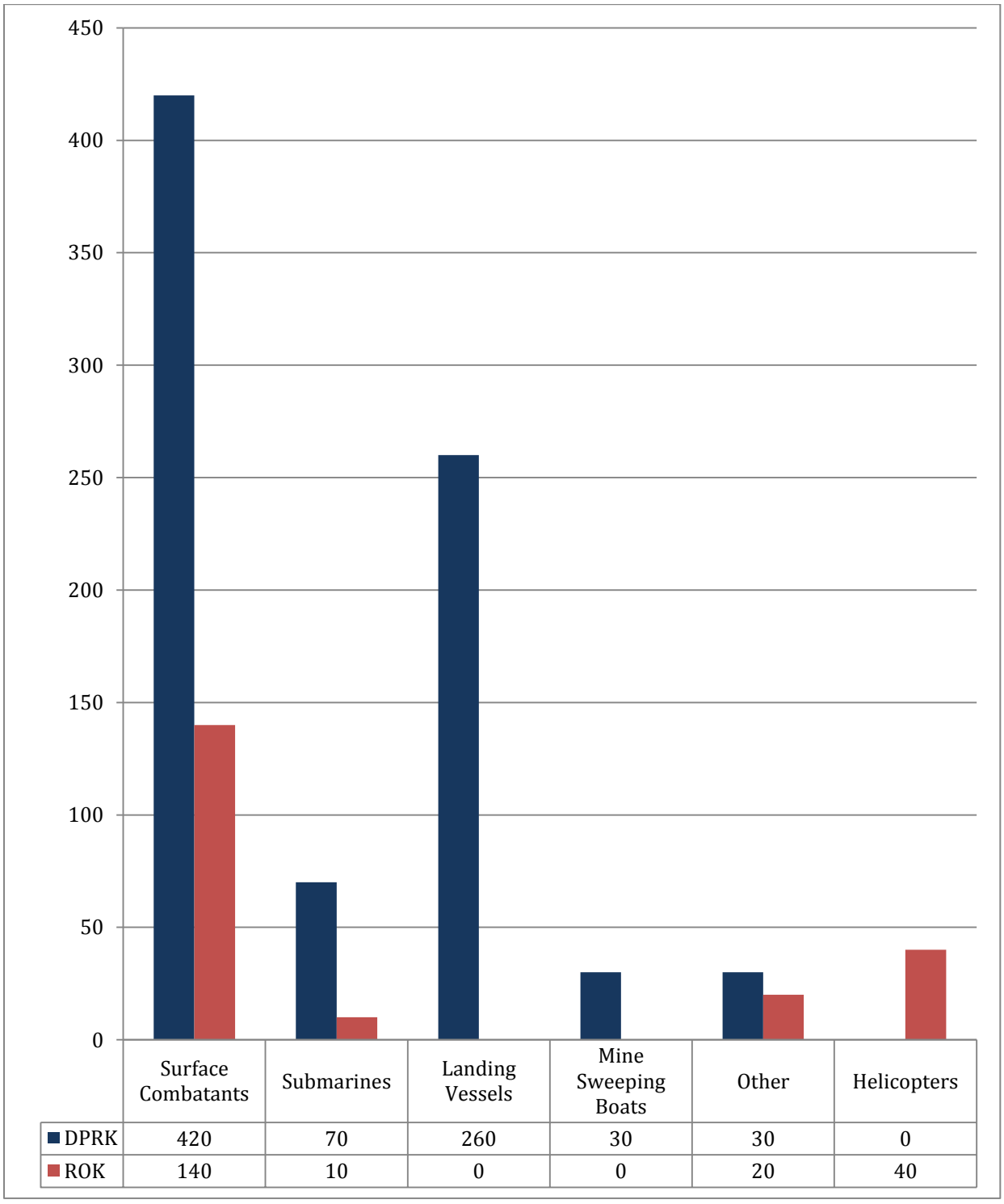
Figure 2.6b: ROK Estimate of Korean Force Balance in 2010: Army



	Tanks	Armored Vehicles	Artillery/MRLS	Guided Weapons	River Crossing Equipment	Helicopters	
DPRK	4,100	2,100	13,600	0	3,000	0	
ROK	2,300	2,500	5,200	30	0	600	

Based primarily on material provided from Republic of Korea Ministry of Defense, *Defense White Paper 2010.* Some equipment figures are estimates. All equipment figures represent equipment in active service.

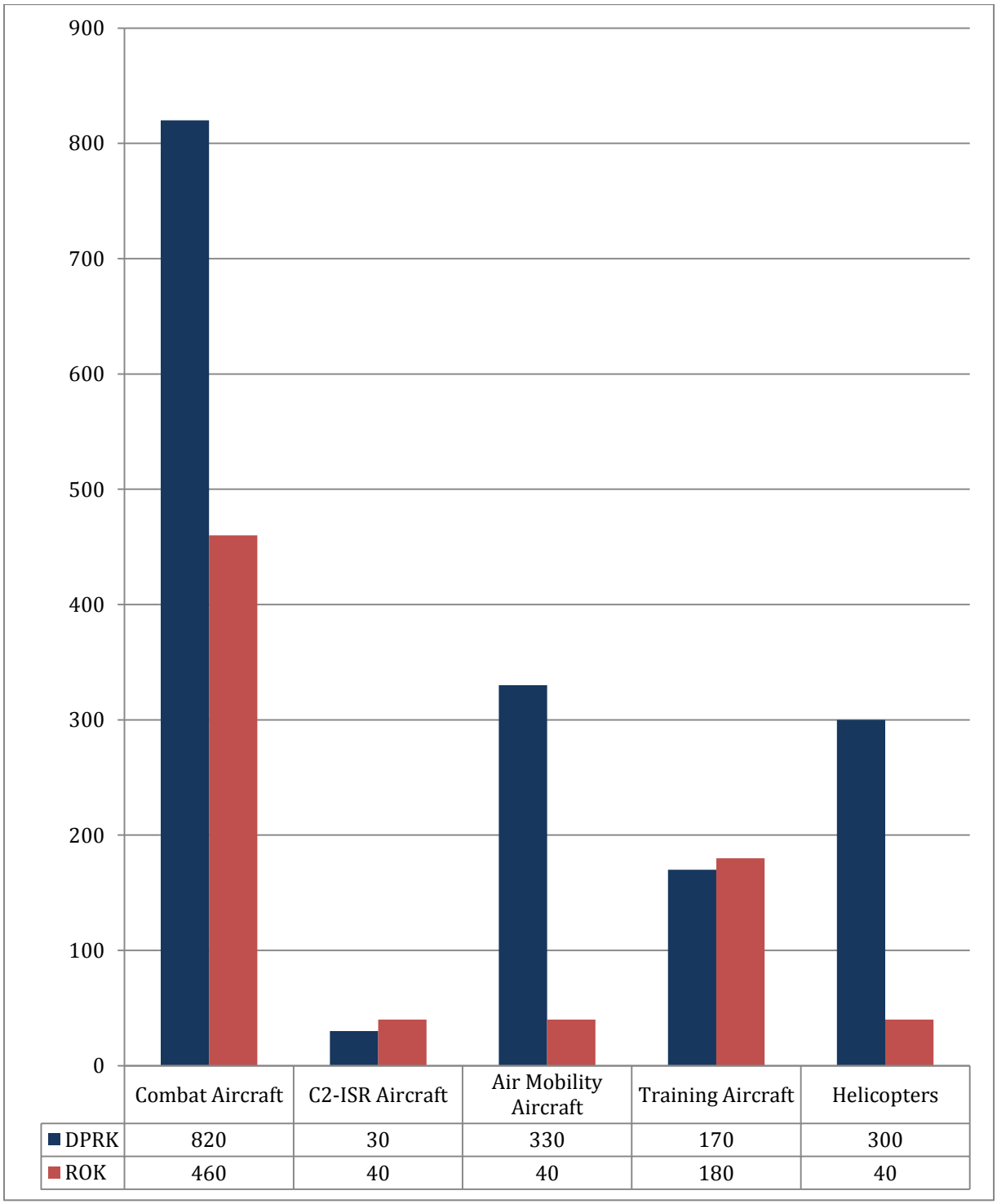
Figure 2.6c: ROK Estimate of Korean Force Balance in 2010: Navy



	Surface Combatants	Submarines	Landing Vessels	Mine Sweeping Boats	Other	Helicopters
DPRK	420	70	260	30	30	0
ROK	140	10	0	0	20	40

Based primarily on material provided from Republic of Korea Ministry of Defense, *Defense White Paper 2010.* Some equipment figures are estimates. All equipment figures represent equipment in active service.

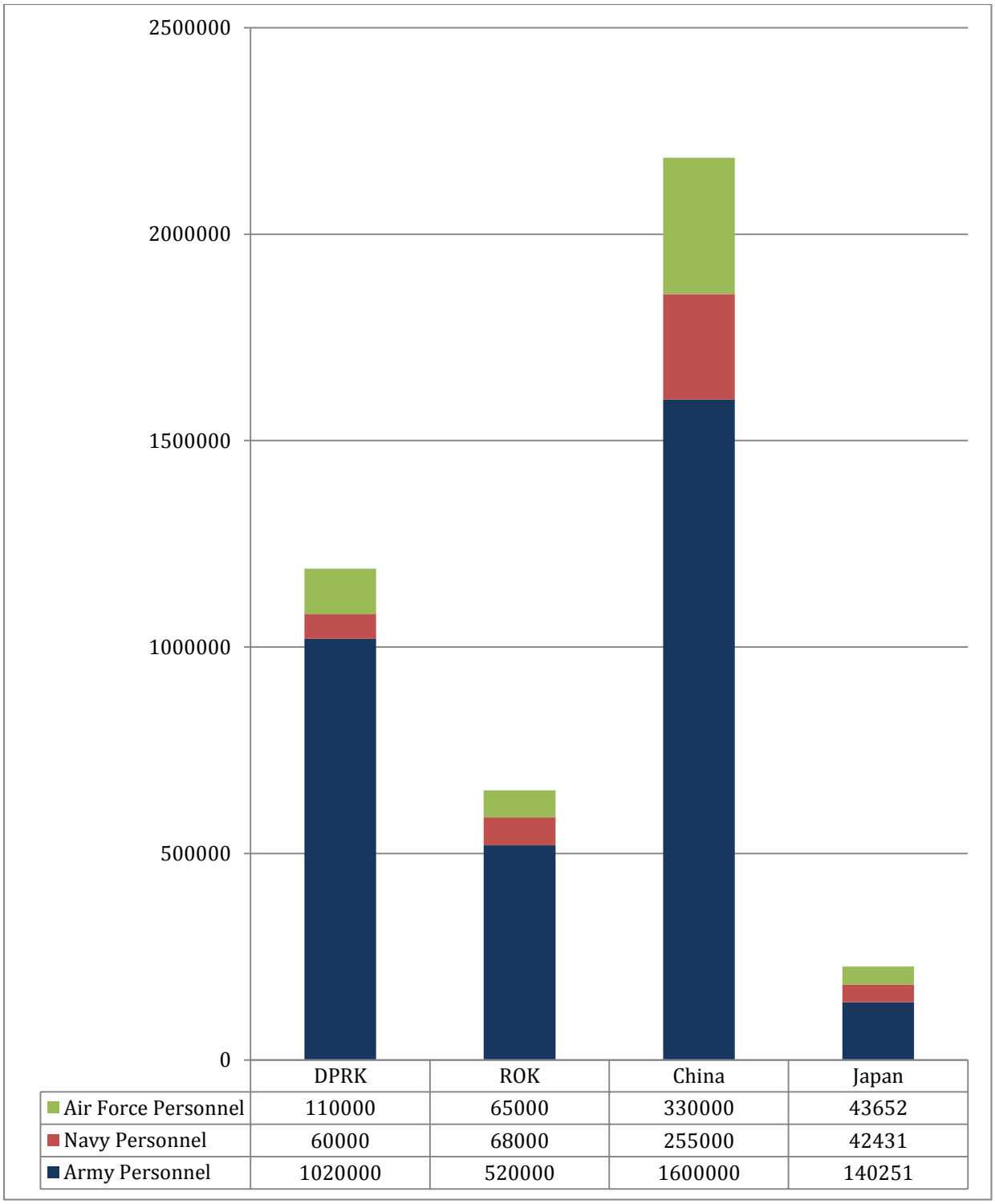
Figure 2.6d: ROK Estimate of Korean Force Balance in 2010: Air Force



	Combat Aircraft	C2-ISR Aircraft	Air Mobility Aircraft	Training Aircraft	Helicopters
DPRK	820	30	330	170	300
ROK	460	40	40	180	40

Based primarily on material provided from Republic of Korea Ministry of Defense, *Defense White Paper 2010.* Some equipment figures are estimates. All equipment figures represent equipment in active service

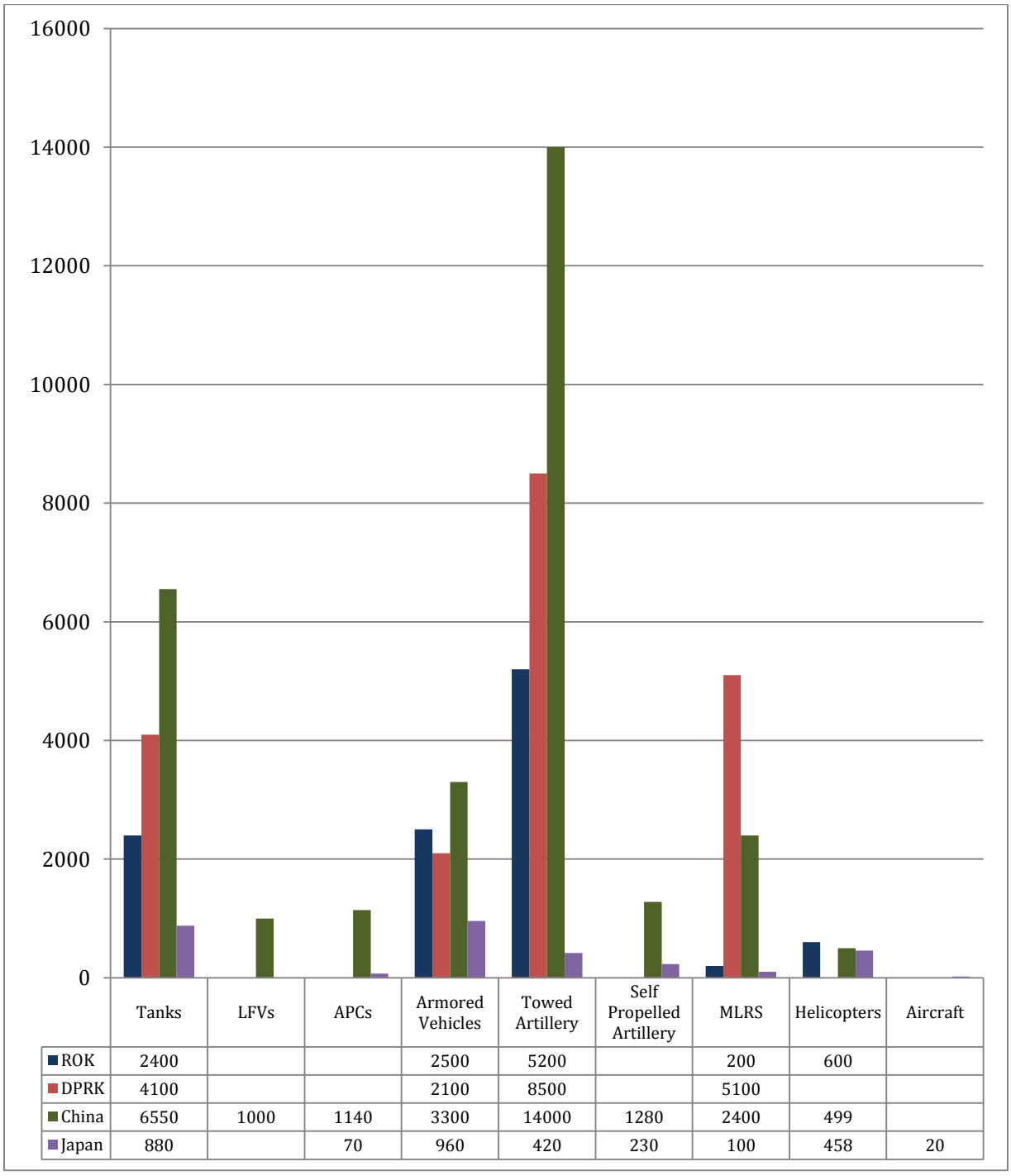
Figure 2.6e: ROK Estimate of Northeast Asian Force Balance in 2010: Manpower



	DPRK	ROK	China	Japan
Air Force Personnel	110000	65000	330000	43652
Navy Personnel	60000	68000	255000	42431
Army Personnel	1020000	520000	1600000	140251

Based primarily on material provided from Republic of Korea Ministry of Defense, *Defense White Paper 2010.* Some equipment figures are estimates. All equipment figures represent equipment in active service.

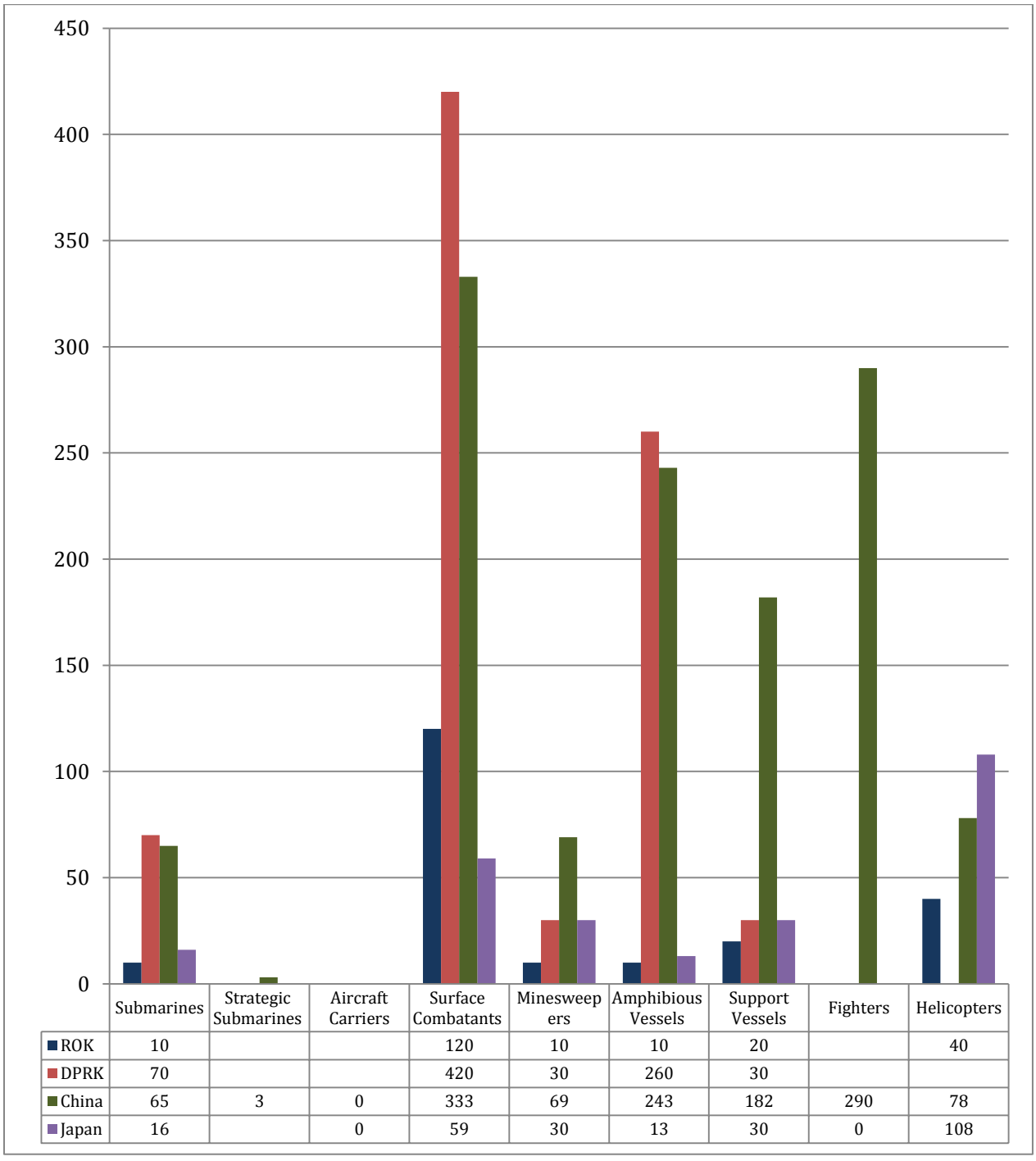
Figure 2.6f: ROK Estimate of Northeast Asian Force Balance in 2010: Army



	Tanks	LFVs	APCs	Armored Vehicles	Towed Artillery	Self Propelled Artillery	MLRS	Helicopters	Aircraft
ROK	2400			2500	5200		200	600	
DPRK	4100			2100	8500		5100		
China	6550	1000	1140	3300	14000	1280	2400	499	
Japan	880		70	960	420	230	100	458	20

Based primarily on material provided from Republic of Korea Ministry of Defense, *Defense White Paper 2010.* Some equipment figures are estimates. All equipment figures represent equipment in active service.

Figure 2.6g: ROK Estimate of Northeast Asian Force Balance in 2010: Navy

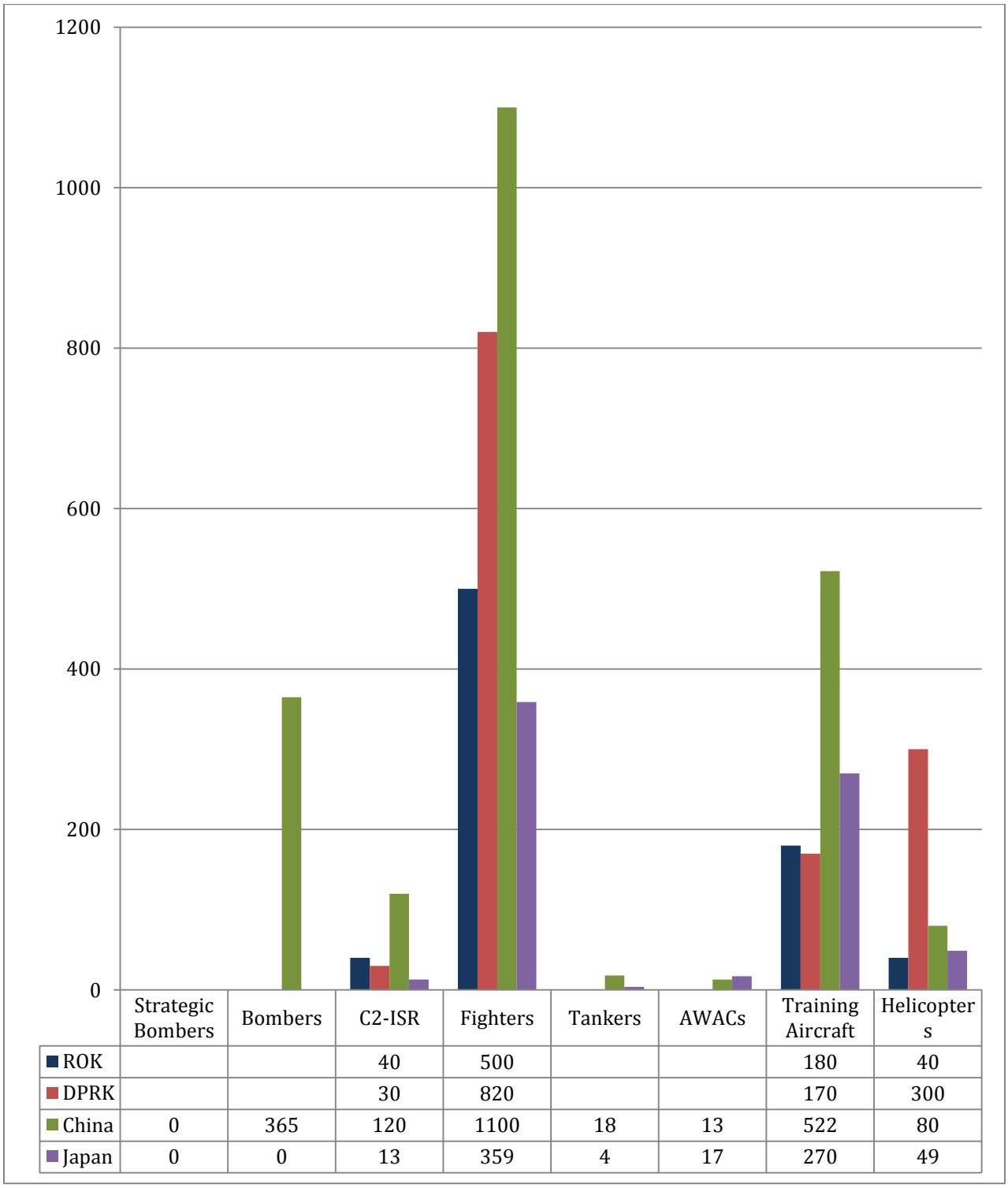


	Submarines	Strategic Submarines	Aircraft Carriers	Surface Combatants	Minesweepers	Amphibious Vessels	Support Vessels	Fighters	Helicopters
ROK	10			120	10	10	20		40
DPRK	70			420	30	260	30		
China	65	3	0	333	69	243	182	290	78
Japan	16		0	59	30	13	30	0	108

Note: ROK Naval Helicopters are estimate based on reconciliation of total helicopters in ROK forces versus those in use by ROK-AF and ROK-N

Based primarily on material provided from Republic of Korea Ministry of Defense, *Defense White Paper 2010.* Some equipment figures are estimates. All equipment figures represent equipment in active service.

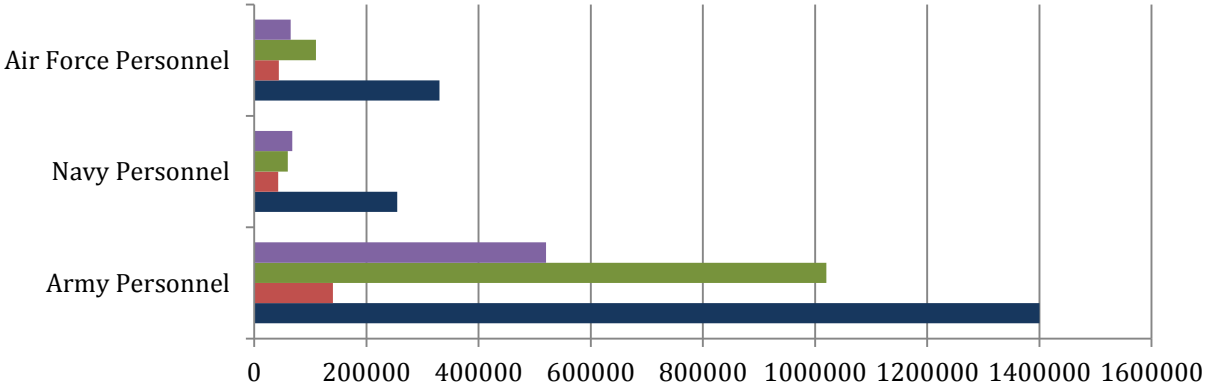
Figure 2.6h: ROK Estimate of Northeast Asian Force Balance in 2010: Air Force



	Strategic Bombers	Bombers	C2-ISR	Fighters	Tankers	AWACs	Training Aircraft	Helicopters
ROK			40	500			180	40
DPRK			30	820			170	300
China	0	365	120	1100	18	13	522	80
Japan	0	0	13	359	4	17	270	49

Based primarily on material provided from Republic of Korea Ministry of Defense, *Defense White Paper 2010.* Some equipment figures are estimates. All equipment figures represent equipment in active service.

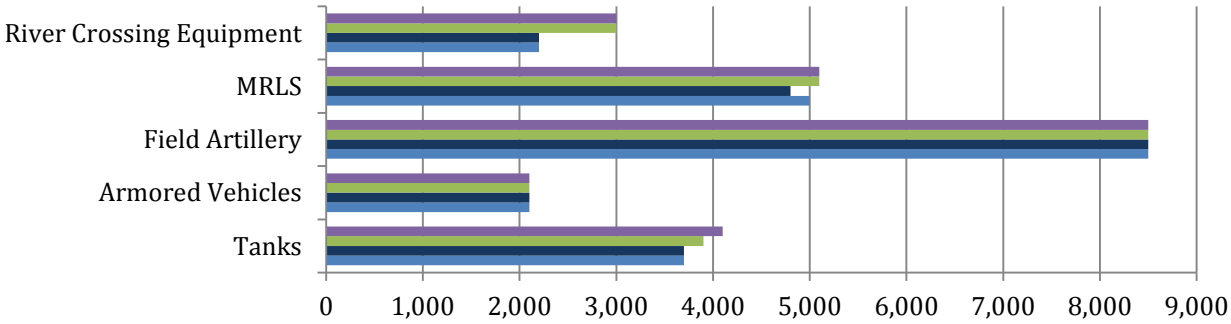
Figure 2.6i: ROK Estimates of DPRK Military Manpower Trends from 2004 to 2010



	Army Personnel	Navy Personnel	Air Force Personnel
South Korea	520000	68000	65000
North Korea	1020000	60000	110000
Japan	140251	42431	43652
China	1400000	255000	330000

Based primarily on material provided from Republic of Korea Ministry of Defense White Papers (2004, 2006, 2008, 2010). Available at http://www.mnd.go.kr/mndEng_2009/main/index.jsp. Some equipment figures are estimates. All equipment figures represent equipment in active service.

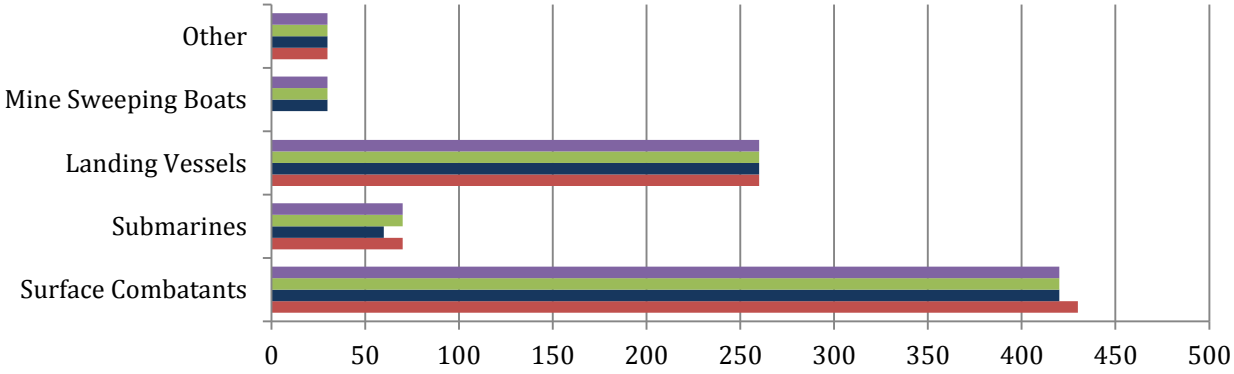
Figure 2.6j: ROK Estimates of DPRK Army Equipment Trends from 2004 to 2010



	Tanks	Armored Vehicles	Field Artillery	MRLS	River Crossing Equipment
2010	4,100	2,100	8,500	5,100	3,000
2008	3,900	2,100	8,500	5,100	3,000
2006	3,700	2,100	8,500	4,800	2,200
2004	3,700	2,100	8,500	5,000	2,200

Based primarily on material provided from Republic of Korea Ministry of Defense White Papers (2004, 2006, 2008, 2010). Available at http://www.mnd.go.kr/mndEng_2009/main/index.jsp. Some equipment figures are estimates. All equipment figures represent equipment in active service.

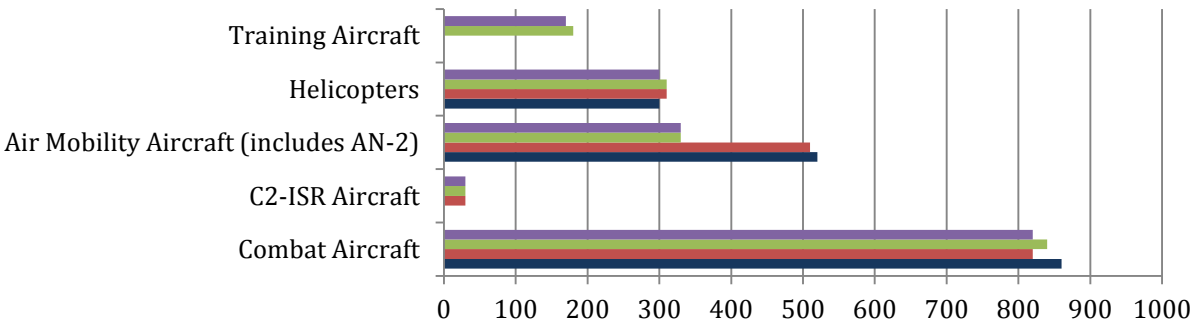
Figure 2.6k: ROK Estimates of DPRK Navy Equipment Trends from 2004 to 2010



	Surface Combatants	Submarines	Landing Vessels	Mine Sweeping Boats	Other
2010	420	70	260	30	30
2008	420	70	260	30	30
2006	420	60	260	30	30
2004	430	70	260		30

Based primarily on material provided from Republic of Korea Ministry of Defense White Papers (2004, 2006, 2008, 2010). Available at http://www.mnd.go.kr/mndEng_2009/main/index.jsp. Some equipment figures are estimates. All equipment figures represent equipment in active service.

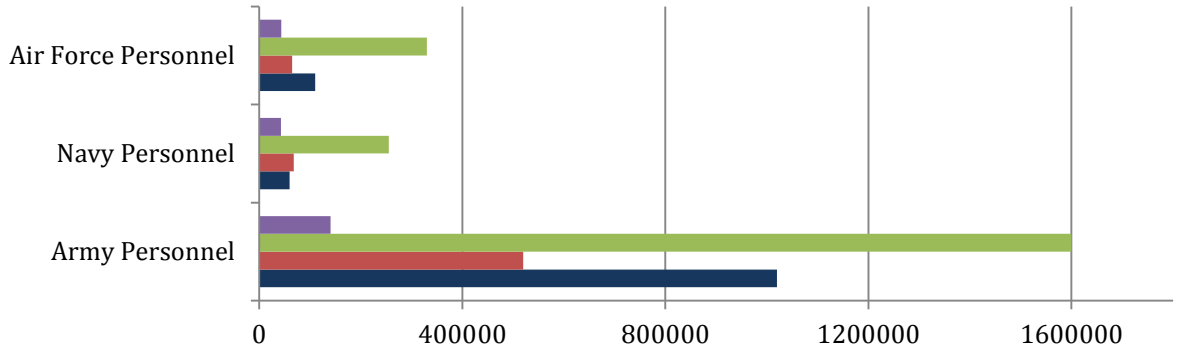
Figure 2.6l: ROK Estimates of DPRK Air Force Equipment Trends from 2004 to 2010



	Combat Aircraft	C2-ISR Aircraft	Air Mobility Aircraft (includes AN-2)	Helicopters	Training Aircraft
2010	820	30	330	300	170
2008	840	30	330	310	180
2006	820	30	510	310	
2004	860		520	300	

Based primarily on material provided from Republic of Korea Ministry of Defense White Papers (2004, 2006, 2008, 2010). Available at http://www.mnd.go.kr/mndEng_2009/main/index.jsp. Some equipment figures are estimates. All equipment figures represent equipment in active service.

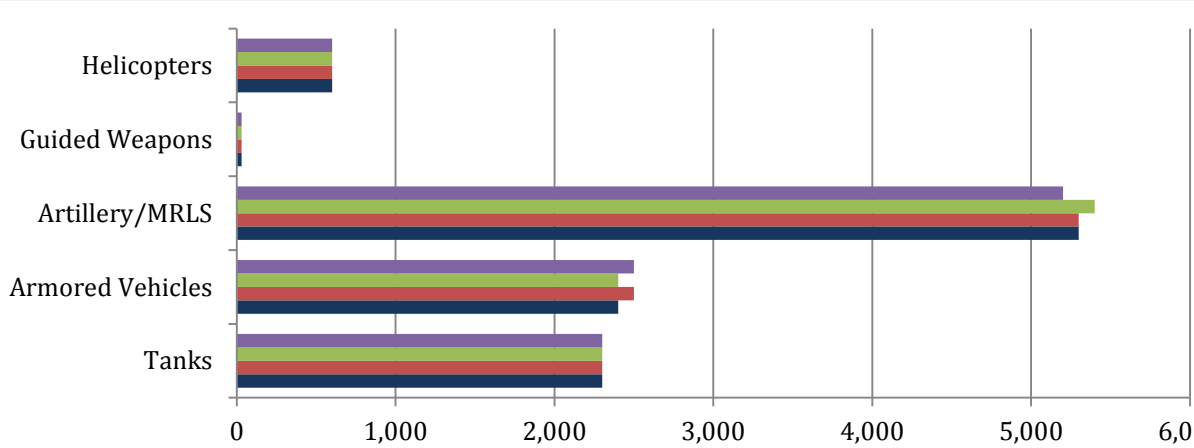
Figure 2.6m: ROK Estimates of ROK Manpower Trends from 2004 to 2010



	Army Personnel	Navy Personnel	Air Force Personnel
Japan	140251	42431	43652
China	1600000	255000	330000
ROK	520000	68000	65000
DPRK	1020000	60000	110000

Based primarily on material provided from Republic of Korea Ministry of Defense White Papers (2004, 2006, 2008, 2010). Available at http://www.mnd.go.kr/mndEng_2009/main/index.jsp. Some equipment figures are estimates. All equipment figures represent equipment in active service.

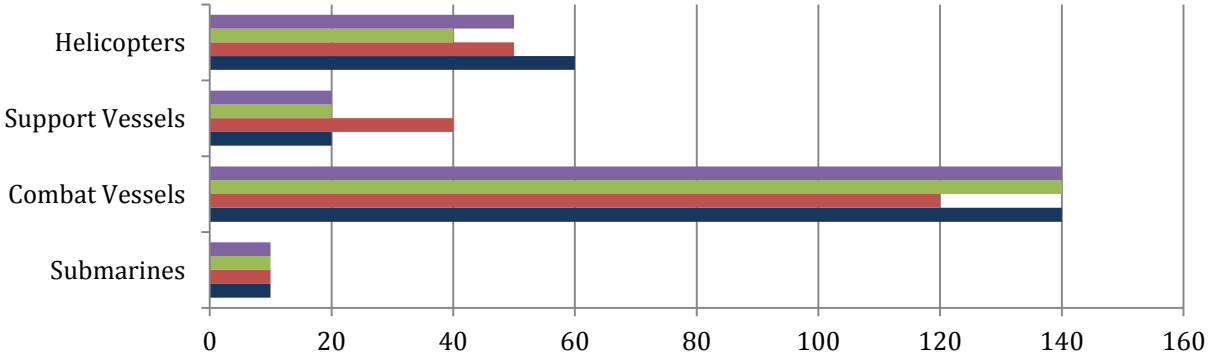
Figure 2.6n: ROK Estimates of ROK Army Equipment Trends from 2004 to 2010



	Tanks	Armored Vehicles	Artillery/MRLS	Guided Weapons	Helicopters
2010	2,300	2,500	5,200	30	600
2008	2,300	2,400	5,400	30	600
2006	2,300	2,500	5,300	30	600
2004	2,300	2,400	5,300	30	600

Based primarily on material provided from Republic of Korea Ministry of Defense White Papers (2004, 2006, 2008, 2010). Available at http://www.mnd.go.kr/mndEng_2009/main/index.jsp. Some equipment figures are estimates. All equipment figures represent equipment in active service.

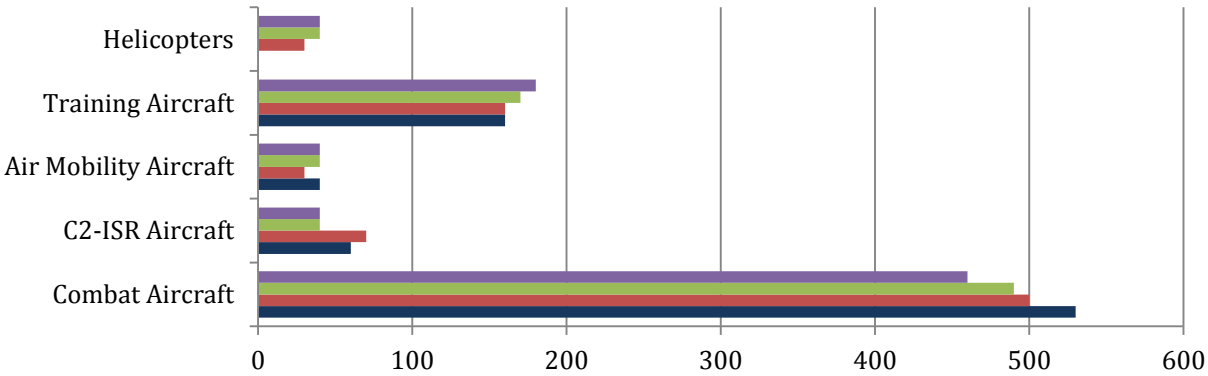
Figure 2.6o: ROK Estimates of ROK Navy Equipment Trends from 2004 to 2010



	Submarines	Combat Vessels	Support Vessels	Helicopters
2010	10	140	20	50
2008	10	140	20	40
2006	10	120	40	50
2004	10	140	20	60

Based primarily on material provided from Republic of Korea Ministry of Defense White Papers (2004, 2006, 2008, 2010). Available at http://www.mnd.go.kr/mndEng_2009/main/index.jsp. Some equipment figures are estimates. All equipment figures represent equipment in active service.

Figure 2.6p: ROK Estimates of ROK Air Force Equipment Trends from 2004 to 2010



	Combat Aircraft	C2-ISR Aircraft	Air Mobility Aircraft	Training Aircraft	Helicopters
2010	460	40	40	180	40
2008	490	40	40	170	40
2006	500	70	30	160	30
2004	530	60	40	160	

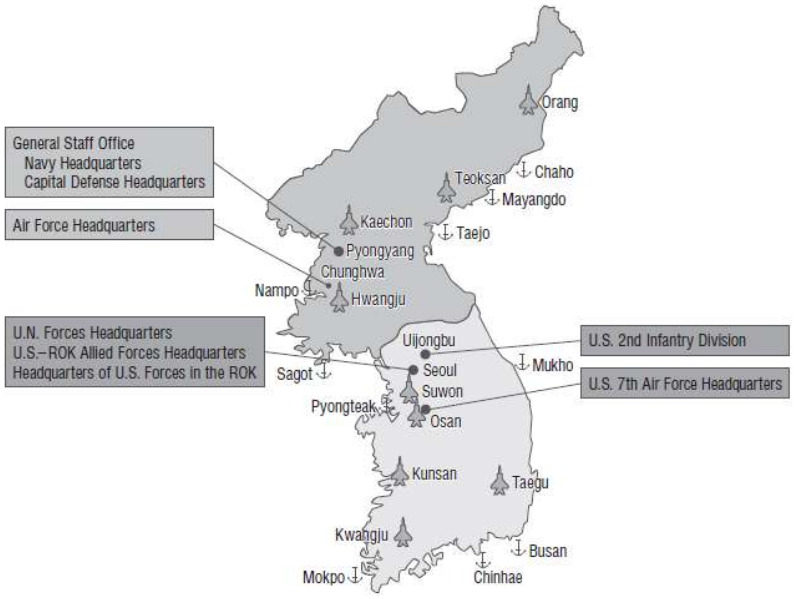
Based primarily on material provided from Republic of Korea Ministry of Defense White Papers (2004, 2006, 2008, 2010). Available at http://www.mnd.go.kr/mndEng_2009/main/index.jsp. Some equipment figures are estimates. All equipment figures represent equipment in active service.

Government of Japan Conventional Force Estimates

> "North Korea's military behavior has increased tension over the Korean peninsula and constitutes a serious destabilizing factor for the entire East Asian region, including Japan."

Figure 2.7a: Japanese Summary Estimates of Forces on the Korean Peninsula in 2010

DPRK active-service military personnel represent nearly 5% of the country's overall population, with roughly two-thirds deployed close to the DMZ. The DPRK continues to abide by the Four Military Guidelines (extensive training for soldiers, modernizing all the armed forces, arming the entire population and fortifying the entire country). Key DPRK military capabilities include 240mm multiple launch rockets and 170mm self-propelled guns that can target Seoul. 60 midget submarines and 140 air-cushioned landing crafts are believed to be used for infiltration or transportation of special operations forces. Among its aging fleet of combat aircraft are fourth-generation MIG-29s and SU-25s. A large number of outdated An-2s are also believed to be used to transport SOF personnel.



		North Korea	ROK	U.S. Forces in ROK
Total armed forces		Approx. 1.1 million personnel	Approx. 690,000 personnel	Approx. 25,000 personnel
Army	Ground troops	Approx. 1 million personnel	Approx. 560,000 personnel	Approx. 17,000 personnel
	Battle tanks	T-62, T-54/-55, etc. Approx. 3,500	88, M-47, M-48, etc. Approx. 2,750	M-1
Navy	Naval vessels	Approx. 650; 106,000 tons	Approx. 190; 181,000 tons	Supporting corps only
	Destroyers Frigates Submarines	 3 23	10 9 11	
	Marines		2 divisions; approx. 25,000 personnel	
Air Force	Combat aircraft	Approx. 620	Approx. 490	Approx. 60
	3rd and 4th generation fighters	Mig-23×56 Mig-29×35 Su-25×34	F-4×70 F-16×164 F-15×39	F-16×40
Reference	Population	Approx. 22.7 million	Approx. 48.5 million	
	Military service	Army: 5–12 years Navy: 5–10 years Air Force: 3–4 years	Army: 18–24 months Navy: 20–26 months Air Force: 21–27 months	

Graphics and narrative based on material from "Defense of Japan 2010," *Japanese Ministry of Defense*, pp. 39-52

Figure 2.7b: Japanese Estimates of Japanese Self Defense Forces

Category			1976 NDPG	1995 NDPG	2004 NDPG	2005 Mid-Term Defense Program at Time of Completion
GSDF		Authorized personnel Regular Ready reserve	180,000	160,000 145,000 15,000	155,000 148,000 7,000	About 161,000 About 152,000[1] 8,000
	Major units	Regionally deployed units in peacetime	12 divisions 2 combined brigades	8 divisions 6 brigades	8 divisions 6 brigades	8 divisions 6 brigades
		Mobile operation units	1 armored division 1 artillery brigade 1 airborne brigade 1 combined training brigade 1 helicopter brigade	1 armored division 1 airborne brigade 1 helicopter brigade	1 armored division Central Readiness Force	1 armored division Central Readiness Force
		Ground-to-air guided missile units	8 anti-aircraft artillery groups	8 anti-aircraft artillery groups	8 anti-aircraft artillery groups	8 anti-aircraft artillery groups
	Main equipment	Tanks Main artillery	— —	About 900 About 900/vehicle	About 600 About 600/vehicle	About 790 About 830/vehicle
MSDF	Major units	Destroyer units (for mobile operations) Destroyer units (regional district units) Submarine units Minesweeping units Patrol aircraft units	4 escort flotillas (Regional units) 10 units 6 divisions 2 minesweeper flotillas (Land-based)16 squadrons	4 escort flotillas (Regional units) 7 units 6 divisions 1 minesweeper flotilla (Land-based)13 squadrons	4 escort flotillas (8 divisions) 5 divisions 4 divisions 1 minesweeper flotilla 9 squadrons	4 escort flotillas (8 divisions) 6 divisions 5 divisions 1 minesweeper flotilla 9 squadrons
	Main equipment	Destroyers Submarines Combat aircraft	About 60 ships 16 ships About 220 aircraft	About 50 ships 16 ships About 170 aircraft	47 ships 16 ships About 150 aircraft	48 ships 16 ships About 170 aircraft
ASDF	Major units	Aircraft control & warning units Fighter units Fighter-interceptor units Support fighter units Air Reconnaissance Units Air Transport Units Air refueling/ transport units Surface-to-air guided Missile Units	28 warning groups — 1 squadron — 10 squadrons 3 squadrons 1 squadron 3 squadrons — 6 groups	8 warning groups 20 warning squadrons 1 squadron — 9 squadrons 3 squadrons 1 squadron 3 squadrons — 6 groups	8 warning groups 20 warning squadrons 1 airborne warning squadron (2 squadrons) 12 squadrons — — 1 squadron 3 squadrons 1 squadron 6 groups	8 warning groups 20 warning squadrons 1 airborne warning squadron (2 squadrons) 12 squadrons — — 1 squadron 3 squadrons 1 squadron 6 groups
	Main equipment	Combat aircraft (fighter aircraft)	About 430 aircraft (about 350 aircraft)	About 400 aircraft (about 300 aircraft)	About 350 aircraft (about 260 aircraft)	About 350 aircraft (about 260 aircraft)
Main equipment & major units which can also be used in ballistic missile defense		Aegis-equipped destroyers	—	—	4 ships	4 ships
		Aircraft control & warning units Surface-to-air guided missile units	— — —	— — —	7 groups 4 squadrons 3 groups	7 groups 4 squadrons 3 groups

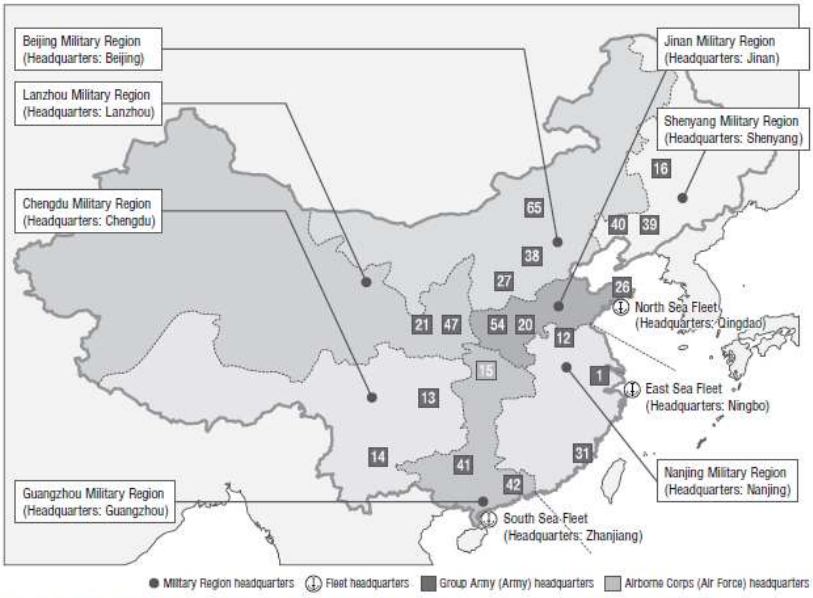
Note 1: In regards to the increase of full-time SDF personnel as outlined in the 2005 Mid-Term Defense Program, in order to effectively respond to new threats, and diverse contingencies, and for Japan to proactively engage in international peace cooperation activities on its own initiative, current levels will be maintained, increases to make up for vacant spots will be around 146,000.

Graphics and narrative based on material from "Defense of Japan 2010," *Japanese Ministry of Defense,* pp. 161

Figure 2.7c: Japanese Estimates of Chinese Armed Forces in 2010

> "China has begun modernizing its military forces, backed by the high and constant increase in its defense budget. In its military modernization China appears to give particular priority to the Taiwan issue as an issue of national sovereignty and territorial integrity, and for the time being it will probably aim for the improvement of military capabilities to prevent Taiwan's independence and others, but in recent years, China has begun acquiring capabilities for missions other than the Taiwan issue…. China has been rather intensifying its activities in waters near Japan. The lack of transparency of its national defense policies and the military activities are a matter of concern for the region and the international community, including Japan, which should require prudent analysis"

The Japanese 2010 White Paper notes that China has focused on the "mechanization and informationization" of its military power, with fewer formations of marching soldiers noticed in military parades. Instead mobile missile, combat vehicle, aircraft formations and advanced equipment such as early warning radars and UAVs have increased their presence. China has reduced the number of military personnel, notably in the army, and has focused on the modernization of its armed forces, notably its naval, air, nuclear and missile capabilities. China is working to increase joint operability between its services and branches and is seeking to build up its defense industry.



Note: Army and Air Force Military Regions are identical. A Group Army consists of several divisions and brigades and has tens of thousands of personnel.

		China	Taiwan (Reference)
Total military forces		Approx. 2.3 million troops	Approx. 290,000 troops
Ground forces	Group troops	Approx. 1.6 million troops	Approx. 200,000 troops
	Tanks	Type-98A, Type-96, Type-88A/B and others Approx. 7,550 vehicles	M-60, M-48A/H and others Approx. 1,830 vehicles
Maritime forces	Warships	Approx. 950 vessels/1.343 million tons	Approx. 330 vessels/ 207,000 tons
	Destroyers & frigates	Approx. 75 vessels	Approx. 30 vessels
	Submarines	Approx. 60 vessels	4 vessels
	Marines	Approx. 10,000 troops	Approx. 15,000 troops
Air forces	Combat aircraft	Approx. 1,950 aircraft	Approx. 530 aircraft
	Modern fighters aircraft	J-10×120 Su-27×166 Su-30×97 (Fourth-generation fighters 383 aircraft)	Mirage 2000×57 F-16×146 F-CK-1 (IDF) ×128 (Fourth-generation fighters 331 aircraft)
Reference	Population	Approx. 1.339 billion	Approx. 23 million
	Term of service	2 years	1 year

Source: The Military Balance 2010 and others.

Graphics and narrative based on material from "Defense of Japan 2010," *Japanese Ministry of Defense*, pg 53-80

Section 3: US Forces in Korea and the Pacific the Pacific

The US sees the ROK as a critical ally, and has legal obligations under U.N. Security Council Resolutions passed in 1950. These resolutions make the US head of the United Nations Command, and the ROK/US Mutual Security Agreement of 1954, which commits both nations to assist each other in case of attack from outside forces. The US is also part of the ROK/US Combined Forces Command (CFC) established in 1978. The Commander of US forces in Korea serves as Commander in Chief of both the United Nations Command (CINCUNC) and the CFC, and is responsible for maintaining the armistice agreement that suspended the Korean War on July 27, 1953.

Figure 3.1 show a Japanese estimate of how the forces the US still maintains in the ROK compare with those of the DPRK and the ROK. As has been noted in the previous section, the Japanese data provides a useful estimate of how small the US forces in the ROK now are, and shows that they have been reduced to a size that is largely demonstrative, if not a virtual trigger force.

The US national military strategy for 2011 describes the US strategy for Korea and Northeast Asia, and for shaping the Korean military balance, as follows:[20]

> Though still underpinned by the US bilateral alliance system, Asia's security architecture is becoming a more complex mix of formal and informal multilateral relationships and expanded bilateral security ties among states.
>
> We expect to maintain a strong military presence in Northeast Asia for decades. We will work with the Japan Self-Defense Forces to improve their out-of-area operational capabilities as the nation adjusts its defense posture. The Republic of Korea has proven a steadfast ally supporting US security efforts around the world; our commitment to the Republic of Korea is unwavering as North Korea remains a provocative threat to regional stability. We will retain operational control over combined forces on the Korean peninsula through 2015 and provide assistance to South Korea as it expands its security responsibilities. We will continue to work with Japan and South Korea to help improve security ties between them, enhance military cooperation, and preserve regional stability.

US Forces in Korea

Major force elements in Korea include the Eighth US Army, US Air Forces Korea (Seventh Air Force) and US Naval Forces Korea. At one point the US occupied some 85 active installations in the Republic of Korea, but it has cut its total military manning by over a third from about 44.200 personnel in 1990, and 36,300 personnel in 2000 to an agreed force level of 28,500: (Army: 19,755, Navy: 274, Air Force: 8,815, Marines: 242.

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[20] Source: Admiral M. G. Mullen, *The National Military Strategy of the United States of America, 2011*, Chairman of the Joint Chiefs of Staff, February 8, 2011, pp. 13-14, http://www.defense.gov/pubs/.

The IISS does not provide estimates for the current holdings of US forces in Korea. Global Security estimates that US equipment now includes some 140 M1A1 tanks, 170 Bradley armored vehicles, 30 155mm self-propelled howitzers, 30 MRLs as well as a wide range of surface-to-surface and surface-to-air missiles, e.g., Patriot, and 70 AH-64 helicopters.[21] These estimates seem dated and may exaggerate some aspects of the equipment in active US forces.

Global Security also estimates that US Air Forces Korea possessed approximately 100 aircraft: advanced fighters, e.g., 70 F-16s, 20 A-10 anti-tank attack planes, various types of intelligence-collecting and reconnaissance aircraft including U-2s, and the newest transport aircraft. This number does not seem to reflect recent force cuts, and the Japanese estimate of 60 US combat aircraft (40 modern F-16s) seems more correct. US air strength could be rapidly reinforced by the Seventh Fleet and the Seventh Air Force Command.[22]

Only limited manpower and equipment are allocated to US Naval Forces Korea, US Marine Forces Korea, and Special Operations Command Korea in peacetime. However, the US Pacific Command can rapidly provide reinforcements.[23]

General Walter L. Sharp, Commander, UNC/CFC/USFK provided the following overview of the capabilities of DPRK, and US and ROK forces, in a speech to the East Asia Institute on July 9, 2010—as well as the ongoing US force changes summarized in **Figure 3.2**:

> …2010 has proven to be a very fast paced year. I'd like to begin our discussion today by sharing with you three things which I think greatly influence and impact our efforts: First, the North Korean threat, second, the North Korean attack on the *Cheonan*, and third, our combined transformation efforts.
>
> First, North Korea poses a serious asymmetric threat to peace and stability in Northeast Asia. While the responsible nations of the world are looking to reduce their weapons of mass destruction, North Korea is continuing its development of these weapons systems and their delivery vehicles. Clearly this is a dangerous situation, not just for the United States, not just for the Republic of Korea, but also for the entire region.
>
> Another unconventional threat posed by North Korea is in the size and disposition of their special operations forces. Even in armistice, North Korea has displayed the willingness to use these forces. The threats of the North Korean forces have shown themselves in their attack on the *Cheonan*, and the assassination team targeting the senior most individual to have defected from North Korea.
>
> North Korea also continues to build their conventional capabilities and threaten their use as a means to manipulate the world community. One of North Korea's largest capabilities, in terms of quantity and disposition, exists in the form of artillery and missile forces. This poses an asymmetric threat, one that holds at risk the capital of one of the world's most important economies right here in Seoul.
>
> While North Korea remains a potent military threat, they do not have the ability to reunify the peninsula by force. However, as demonstrated by the attack on the *Cheonan* and the asymmetric aspects of the North Korean threat that I discussed earlier, this merely changes the nature of the threat and how we are prepared to deter and defeat it. Let me be clear, by no means does North Korea's inability to reunify the peninsula by force equate to an absence of a serious military threat. Rather, North Korea maintains a range of capabilities to engage in provocations. However these provocations and North Korea's irresponsible behavior in the international arena to include events such as the continued oppression of its own people, the

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21 *Global Security,* "US Forces Order of Battle," available at www.globalsecurity.org/military/ops/**korea**-orbat.htm, "US Forces Korea/Combined Forces Command Combined Ground Component Command (GCC)," *Global Security,* Available at http://www.globalsecurity.org/military/agency/dod/usfk.htm;
"Briefing by Defense Secretary Gates and ROK Minister Lee," October 17, 2008. Available at http://www.america.gov/st/texttrans-elish/2008/October/20081020121847eaifas0.7119104.html

22 "US Forces Order of Battle," *Global Security,* Available at www.globalsecurity.org/military/ops/korea-orbat.htm

23 "US Forces Order of Battle," *Global Security,* Available at www.globalsecurity.org/military/ops/korea-orbat.htm

seizure of ROK assets at the Mt. Kumgang Resort, the sinking of the *Cheonan*, and the development of nuclear capabilities have significantly eroded their ability to effectively use other means to exercise national power in the region.

With very few diplomatic, informational, and economic options available, North Korea is forced to rely almost exclusively on military instruments when it decides to engage in provocations and we must therefore be ever vigilant.

Sun Tzu once said, "Thus the highest form of generalship is to attack the enemy's strategy; the next best is to attack his alliances; the next, in order, is to attack the enemy's army in the field…" More so than ever before, North Korea knows that they cannot defeat our strong and well prepared armies, air forces, navies, and marines, so they are now attacking us in other ways.

…However, the ROK-US Alliance needs more from the entire international community and all countries in the region, in particular China, to work with us in responding to North Korean provocations. We strongly desire Chinese cooperation in addressing North Korea's aggressive behavior, and in particular would welcome Chinese action, even if behind the scenes, to assist in convincing North Korea that its path to security and prosperity lies in stopping its provocative behavior, better relations with its neighbors, and complete, irreversible denuclearization.

It is important that we be willing to have detailed discussions with the Chinese about interests related to the Korean peninsula. I believe it is safe to say that the US and ROK are willing and eager to engage in discussions about each of our interests. We hope that China will do the same. The more we can talk and reach a common understanding about regional security challenges, the better we are able to maintain stability and prosperity in this region. America's five bilateral treaty alliances in Asia have long underpinned regional stability and prosperity. In Northeast Asia, our relationships with Korea and Japan serve as a foundation for American efforts to provide regional stability and prosperity. We look forward to the continued strengthening of these Alliances and the contributions that they make to the region.

I would now like to spend a little bit of time discussing where the ROK-US Alliance is heading in the next few years. From what I mentioned earlier, it is clear that North Korea has increased their efforts to attack our Alliance and our strategic objectives. In addition, the security environment requires that we continue to prepare for any possible threats. To do this, we are continuing to strengthen the Alliance through our ongoing transformation initiatives. We will first demonstrate to the North Koreans that our Alliance and our collective Armed Forces remain strong and cannot be broken. Secondly, we will continue to modify our strategy to create adaptive, agile plans and combat forces that can anticipate and defeat our enemy's provocations, deter aggression, and if deterrence fails, to fight and win.

The decision to delay the transition of wartime operational control until late 2015, as announced by President Lee and President Obama at last weekend's G-20 meeting in Toronto, Canada, demonstrates the strength and agility of this Alliance. Although the ROK and US militaries were on track for OPCON transition in 2012, this adjustment will provide us with additional time to look at OPCON in a broader construct and to further synchronize the various Alliance initiatives and focus on meeting the established timelines for these initiatives. It also allows us to ensure each of the initiatives are mutually supportive and that they collectively support the Joint Vision Statement signed by President Lee and President Obama in 2009.

We will proceed very rapidly to develop a new OPCON Transition plan. This new plan, a plan for the Alliance of 2015, will help align all of our transformation initiatives we have worked on. It will truly be an overarching plan for the Alliance of 2015. Detailed discussion will start at this month's 2+2 talks here in Seoul and be approved at the autumn Security Consultative Meeting between the Secretary of Defense and the Minister of Defense.

The goal of all of our ROK and US transformation efforts is to build adaptive capabilities to deter and defeat any future provocations and to fight and win on the peninsula if this deterrence fails. Transformation efforts consist of the preparation for the transfer of Wartime Operational Control; refining and improving our combined plans; the definition and development of new organizational structures and command and control relationships; the procurement, and integration of Republic of Korea capabilities to lead the warfight; more realistic training based on the North Korean threat of today and the future, as well as continued support for exercises and humanitarian assistance/disaster relief operations in the region; the

consolidation of US military units into two enduring hubs; and lastly, tour normalization for US forces here in Korea.

Let me talk briefly about each of these elements, because these are the elements we will synchronize between now and 2015. To move to the Alliance of 2015, we will seek to better align in our planning efforts. We are taking the opportunity to review our plans and ensure they are realistic based upon the full scale of possible scenarios. This includes North Korean provocations, instability, or full-scale war on the peninsula. We will also ensure that our plans properly address the KORCOM to ROK JCS supporting to supported command and control structures. By doing so, we will ensure that we have the correct and most up-to-date plans in place to guarantee security and stability in the region.

Next, we will be continuing our transformation efforts in the areas of organizational structure and command and control. US Forces Korea will become the United States Korea Command or US KORCOM, providing the necessary manpower for our supporting relationship with the ROK Joint Chiefs of Staff. As a result of the OPCON transition, the KORCOM staff will be dual-hatted as Combined Forces Command, much the same way the US Forces Korea staff is dual hated in CFC

At the same time the United States is transforming our organizational structures, the ROK will also continue to strengthen and build on the "JCS centric operational execution system" which will ensure and reinforce its intelligence, operations planning and execution and joint battlefield management capabilities. The Republic of Korea JCS is developing the command and control systems capable of real time battlefield management and enhanced warning and target acquisition. In turn, the ROK Army is transforming its forces and creating a Ground Forces Operations Command. This command will be stood up a certified by 2015 before OPCON transition takes place.

In support of their planned defense reform, the ROK is already undergoing a process of procuring equipment, and training and organizing forces to lead the warfight. Until these capabilities exist, the United States will provide the agreed upon bridging and enduring capabilities. If OPCON transition had occurred in 2012, ROK forces would have had to rely on some US bridging capabilities, but by adjusting OPCON transition to 2015, the Republic of Korea will have time to field many of the critical organic systems in their Defense Reform plan that will enable them to lead the warfight.

The new Alliance 2015 plan improves our overall readiness by allowing time for these key war- fighting headquarters to be established and the Republic of Korea to acquire critical Command and Control systems and capabilities. The final hand off of wartime Operational Control will be smoother and the end result will be better command and control of Alliance forces. The Strategic Alliance plan for 2015 also gives us the ability to better synchronize and improve our exercises… more robust and realistic exercises that will be based on the North Korean threat of today and the future.

…The decision to adjust OPCON transition also allows us to synchronize the movement of US forces on the peninsula. Currently, US forces are undergoing two major infrastructure moves as part of this transformation. The major southward moves to US Army Garrison-Humphreys will begin in 2012 and will accomplish several goals. First, the relocation allows the United States to give back land, including the Yongsan Garrison here in Seoul, back to the Republic of Korea. Second, it allows for a consolidation of US forces into two hubs and will reduce the KORCOM footprint from 110 installations down to 48. The KORCOM headquarters will remain at in Seoul until after the OPCON transition is complete. These two milestones are synchronized with the rest of the strategic Alliance plan for 2015, and will greatly increase KORCOM's ability to command and control US forces and support Korean forces.

The US is committed to ensuring all elements of the new Alliance plan are in place to facilitate its completion by late 2015. We are also reaffirming our commitment through the Tour Normalization program, which directly affects our ability to be able to fight across the full spectrum of conflict that I spoke about earlier. Since the beginning of the summer of 2008, the number of families in Korea has increased from 1,700 to over 4,200 with a goal of almost 5,000 families here by the summer of 2011. Moving forward, we will begin to assign families to Korea for three years, while unaccompanied and

…I am absolutely confident that our new bilateral plan to get us to 2015 – the strategic alliance of 2015 – will better synchronize our ongoing transformation efforts, it will reaffirm the US commitment to the ROK and the region; ensure both nations are even better prepared to swiftly counter, deter, and defeat any North Korean provocations and aggression; and will ultimately result in a much stronger Alliance.

It is important to note that the US provided the ROK with immediate support after the sinking of the Cheonan on March 26, 2010, which the ROK and the US state was caused by a torpedo fired from a DPRK submarine. It did the same when the DPRK fired dozens of rounds of artillery onto the densely populated ROK island of Yeonpyeong near the countries' western border, and killed four people, on November 22, 2010. The US also held joint exercises with the ROK in May, July, and late November 2010 to show its support for the ROK in spite of pressure from China.

US Forces in Japan and USPACOM

Figure 3.3 shows a similar Japanese estimate of the US forces in Japan. As this estimate shows, US forces in Japan are much larger now than US forces in the ROK. More importantly, Japan provides the US with critical basing and staging facilities for any serious Korean conflict.

Figure 3.4 and **3.5** shows that US forces in Japan are only part of the resources the US could bring to bear assuming it relied on the total forces in its Pacific Command (USPACOM). A USPACOM estimate as of January 2011, summarized USPACOM force strength as follows:[24]

> US military and civilian personnel assigned to USPACOM number approximately 325,000, or about one-fifth of total US military strength. US Pacific Fleet includes five aircraft carrier strike groups, approximately 180 ships, 1,500 aircraft and 100,000 personnel. Marine Corps Forces, Pacific possesses about two-thirds of US Marine Corps combat strength, includes two Marine Expeditionary Forces and about 85,000 personnel assigned. US Pacific Air Forces is comprised of approximately 40,000 airmen and more than 300 aircraft, with about 100 additional aircraft deployed to Guam. US Army Pacific has more than 60,000 personnel assigned, including five Stryker brigades. Of note, component command personnel numbers include more than 1,200 Special Operations personnel. Department of Defense Civilians and Contractors in the Pacific Command AOR number about 40,000. Additionally, the US Coast Guard, which frequently supports US military forces in the region, has approximately 27,000 personnel in its Pacific Area.

It is important to note that while these force levels are impressive, they again represent a major cut in US forces and presence since 1990, and during a period in which both China and the DPRK have made major increases in their conventional and WMD capabilities. There has been a steady downward trend in the total personnel, combat aircraft, and major combat ships from the end of the Cold War in 1990 onwards.

Admiral Willard, the US Commander of USPACOM summarized the US role in the Pacific as follows in the following portions of his annual testimony to the Senate Armed Service Committee on March 24, 2010:

> Five of our nation's seven mutual defense treaties are with nations in the Asia- Pacific region. We continue to work closely with these regional treaty allies – Australia, Japan, Republic of Korea, Republic of the Philippines and Thailand – to strengthen and leverage our relationships to enhance security within the region.
>
> … The US–ROK alliance remains strong and critical to our regional strategy in Northeast Asia. General Sharp and I are aligned in our efforts to do what is right for the United States and the ROK as this alliance undergoes a major transformation. I will defer to General Sharp's testimony to provide the details of our

[24] "USPACOM Facts: Headquarters US Pacific Command," *USPACOM,* Available at http://www.pacom.mil/web/Site_Pages/USPACOM/Facts.shtml.

relationship on the Peninsula, but note that General Sharp's progress in handling the transition of wartime Operational Control (OPCON) to the ROK military has been exceptional as has his leadership of US Forces Korea.

The transformation of the US–ROK alliance will ultimately assist the ROK to better meet security challenges both on and off the peninsula. The ROK currently maintains a warship in the Gulf of Aden in support of counter-piracy and maritime security operations, and has provided direct assistance to Operation Enduring Freedom, including demonstrating strong leadership in its decision to deploy a Provincial Reconstruction Team to Afghanistan this year. Of particular note is the evolving trilateral security cooperation between the US, ROK, and Japan. Although there are still policy issues to be addressed in realizing its full potential, the shared values, financial resources, logistical capability, and the planning ability to address complex contingencies throughout the region make this trilateral partnership a goal worth pursuing.

…. Our alliance with Japan is the cornerstone of our security strategy in Northeast Asia. Despite some recent challenges related to US basing in Japan, the military relationship, as well as the overall alliance, remain strong…That being said, we must make every effort – particularly as we celebrate the 50th anniversary of the alliance – to remind the citizens of both the US and Japan of the importance of our alliance to enduring regional security and prosperity.

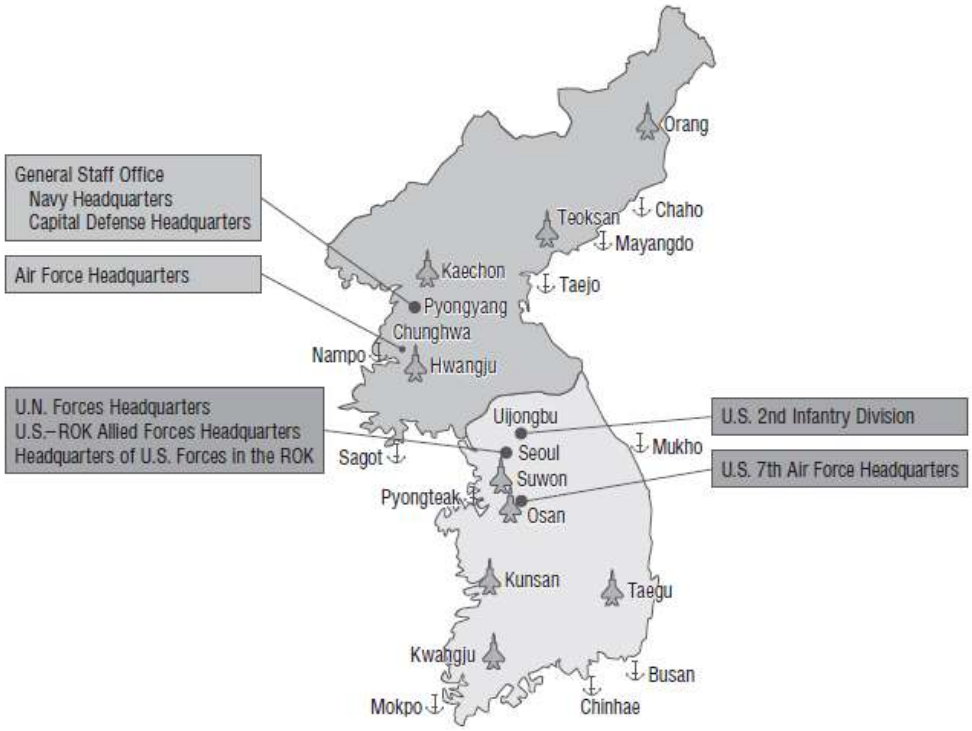
US Pacific Command remains committed to the implementation of the Defense Policy Review Initiative (DPRI). Initiated by the US Secretaries of State and Defense with their Japanese counterparts in 2002, progress on Alliance Transformation and Realignment through the execution of the 2006 Roadmap for Realignment are critical next steps. Major elements of the Realignment Roadmap with Japan include: relocating a Marine Corps Air Station and a portion of a carrier air wing from urbanized to rural areas; co-locating US and Japanese command and control capabilities; deploying US missile defense capabilities to Japan in conjunction with their own deployments; improving operational coordination between US and Japanese forces; and adjusting the burden sharing arrangement through the relocation of ground forces.

The rebasing of 8,000 Marines and their dependents from Okinawa to Guam remains a key element of the Realignment Roadmap. Guam-based Marines, in addition to those Marine Forces that remain in Okinawa, will sustain the advantages of having forward-based ground forces in the Pacific Command AOR. Currently the Government of Japan (GOJ) is reviewing one of the realignment elements that addresses the Futenma Replacement Facility (FRF) and related movement of Marines Corps aviation assets in Okinawa; an action which is directly linked to the relocation of Marines to Guam and a plan to return significant land area to Japan. The GOJ has indicated it expects to complete its review by May of this year. The US remains committed to the 2006 DPRI Roadmap as agreed to by both countries.

The Japan Self Defense Force is advancing its regional and global influence. In the spring and early summer of 2009, Japan deployed two JMSDF ships and two patrol aircraft to the Gulf of Aden region for counter-piracy operations. Although their Indian Ocean-based refueling mission recently ended, Japan remains engaged in the region by providing civil and financial support for reconstruction and humanitarian efforts in Afghanistan and Pakistan for the foreseeable future.

Although the Japanese defense budget has decreased each year since 2002, the Japan Self Defense Forces continue their regular bilateral interactions with the US, and in some multi-lateral engagements with the US and our other allies, such as the Republic of Korea and Australia. Last year witnessed the completion of several successful milestones in our bilateral relationship, including the completion of a yearlong study of contingency command and control relationships and Ballistic Missile Defense (BMD) testing of a third Japan Maritime Self Defense Force Aegis destroyer. Japan continues to maintain over $4 billion in annual Host Nation Support (HNS) to our Japan-based force. Japan HNS contribution remains a vital strategic pillar of respective US and Japanese alliance commitments.

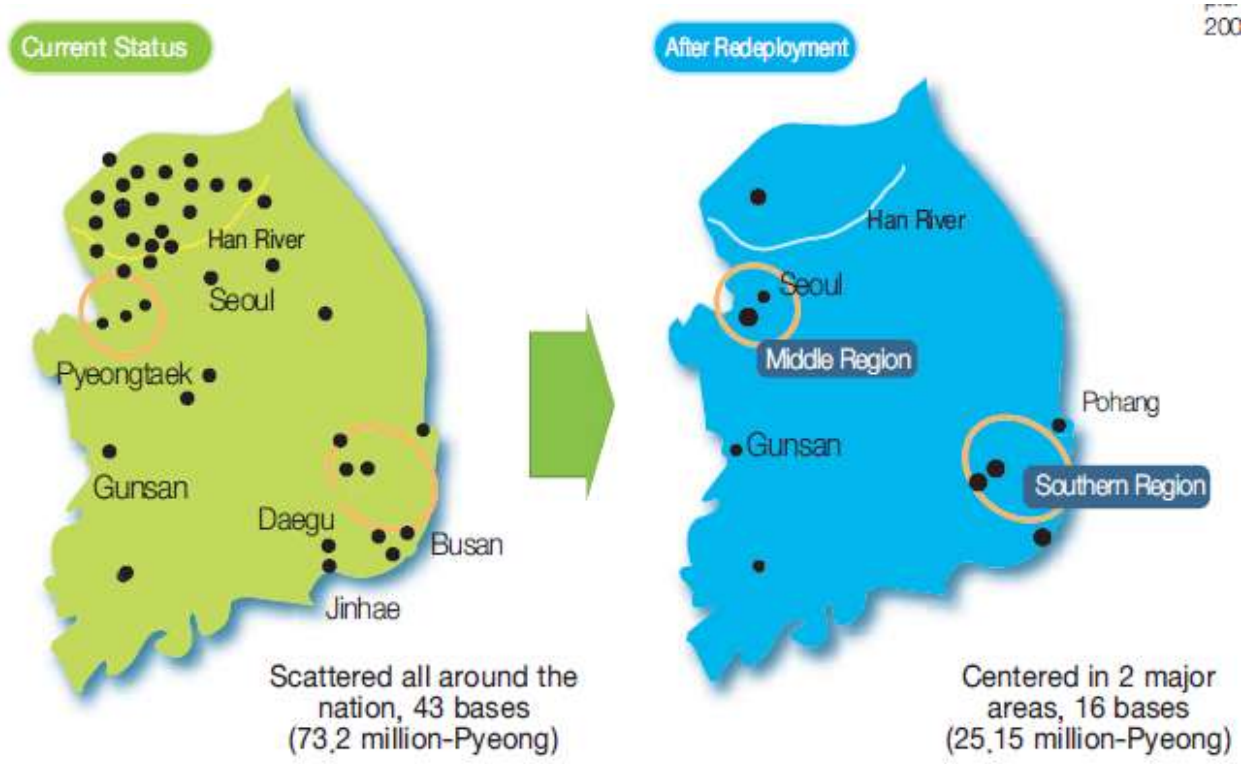
Figure 3.1: Japanese Estimates of US, ROK, and DPRK Forces in the Korean Peninsula



		North Korea	ROK	U.S. Forces in ROK
Total armed forces		Approx. 1.1 million personnel	Approx. 690,000 personnel	Approx. 25,000 personnel
Army	Ground troops	Approx. 1 million personnel	Approx. 560,000 personnel	Approx. 17,000 personnel
	Battle tanks	T-62, T-54/-55, etc. Approx. 3,500	88, M-47, M-48, etc. Approx. 2,750	M-1
Navy	Naval vessels	Approx. 650; 106,000 tons	Approx. 190; 181,000 tons	Supporting corps only
	Destroyers Frigates Submarines	 3 23	10 9 11	
	Marines		2 divisions; approx. 25,000 personnel	
Air Force	Combat aircraft	Approx. 620	Approx. 490	Approx. 60
	3rd and 4th generation fighters	Mig-23×56 Mig-29×35 Su-25×34	F-4×70 F-16×164 F-15×39	F-16×40
Reference	Population	Approx. 22.7 million	Approx. 48.5 million	
	Military service	Army: 5–12 years Navy: 5–10 years Air Force: 3–4 years	Army: 18–24 months Navy: 20–26 months Air Force: 21–27 months	

Graphics and narrative based on material from "Defense of Japan 2010," Japanese Ministry of Defense, pg 53-80

Figure 3.2: Relocation of US Forces in Korea from 2006

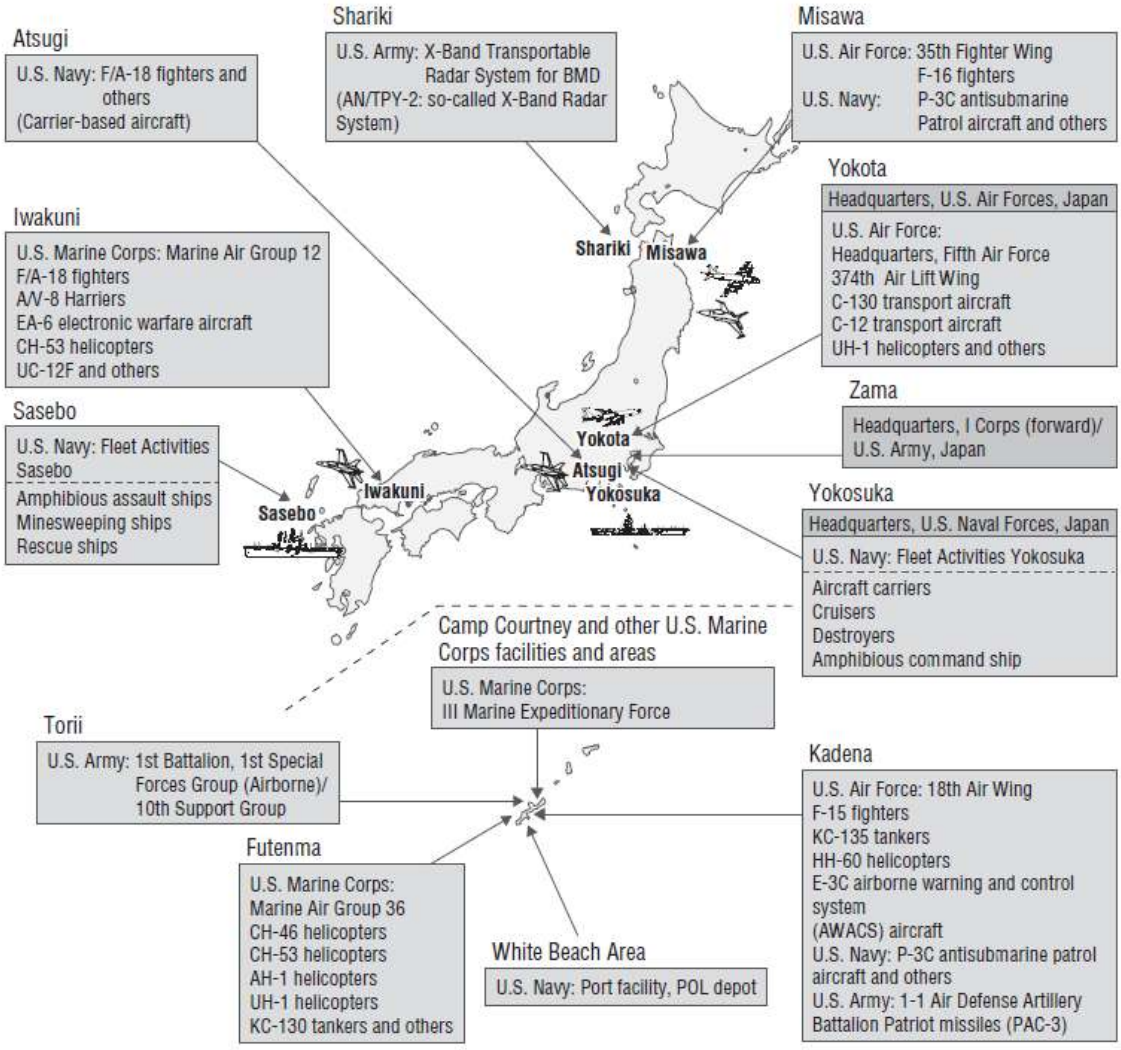


Based primarily on material from Republic of Korea Ministry of Defense, "2006 Defense White Paper," pg. 99

Figure 3.3: Japanese Estimates of US Forces Japan (USFJ) in 2010

> "The security environment around Japan remains challenging. Given that environment, in order for the Japan-US Security Arrangements to continue…, it is necessary that US military presence in Japan is secured which functions adequately as a deterrent that contributes to Japan's defense as well as regional peace and security"[25]

2010 marks the 50th anniversary of the Japan-US Security Treaty and the 2010 Japanese White Paper outlines its intention to implement deepening military cooperation in the coming years. Areas of cooperation will include extended deterrence information security, missile defense and space as well as individual security areas including humanitarian assistance, disaster relief and cyber issues. US forces stationed in Japan serve as a deterrent as well as functioning as an offensive "spear" in the event of armed aggression against Japan.



"Defense of Japan 2010," Japanese Ministry of Defense, pg 259-320

Figure 3.4: US Forces in the Pacific in 2010: Equipment by Type and Location

Pacific Command (PACOM) Headquartered in Hawaii

[25] "Defense of Japan 2010," *Japanese Ministry of Defense*, pg 272

Guam

Abbreviation	Definition	Quantity
SSN	Submarine, nuclear powered	3

Japan

Abbreviation	Definition	Quantity
CVN	Carrier, nuclear powered	1
CGHM	Cruiser, with guided missiles	2
DDG	Destroyer, with guided missiles	7
LCC	Amphibious command ship	1
MCO	Mine countermeasures	4
LHD	Amphibious assault ship	1
LSD	Landing ship, dock	2
LPD	Landing Platform, doc	1
FTR	Aircraft, Fighter	54
AEW	Aircraft, Airborne Early Warning	2
TPT	Aircraft, Transport	10
TKR	Aircraft, Tanker	12
HEL, SAR	Helicopter, Search & Rescue	8
HEL, TPT	Helicopter, Transport	34

ROK

Abbreviation	Definition	Model
MBT	Main battle tank	M-1 Abrams
MBT	Main battle tank	M-2/M-3 Bradley
MBT	Main battle tank	M-109
HEL, ATK	Helicopter, attack	AH-64 Apache
HEL, TPT	Helicopter, transport	CH-47 Chinook
HEL, UTL	Helicopter, utility	UH-60 Black Hawk

ARTY, MLR	Artillery, multiple rocket launcher	MLRS
AD, SAM	Air defense, surface-to-air missile	MIM-104 Patriot
AD, SAM	Air defense, surface-to-air missile	FIM-92A Avenger
FTR	Aircraft, Fighter	F-16C/D
FGA	Aircraft, Fighter/Ground Attack	A-10/OA-10 Thunderbolt II

Pacific

Abbreviation	Definition	Quantity
SSBN	Submarine, nuclear powered, with ballistic missiles	8
SSGN	SSN, with dedicated, non-ballistic missiles	2
SSN	Submarine, nuclear powered	29
CVN	Carrier, nuclear powered	4
CG	Cruiser, with guided missiles	8
DDG	Destroyer, with guided missiles	21
FFG	Frigate, with guided missiles	12
MCO	Mine countermeasures	6
LHD	Amphibious assault ship	3
LCS	Landing ship, support	2
LPD	Landing platform, dock	3
LSD	Landing ship, dock	3

Based primarily on material in International Institute for Strategic Studies, *The Military Balance 2011* (London: Routledge, 2011). Figures do not include equipment used for training purposes. All equipment figures represent equipment in active service.

Figure 3.5: US Forces in the Pacific in 2010: Forces by Role and Location

Japan

Quantity	Role
Army	
1	HQ (9th Theater Army Area Command)
Navy	
1	HQ (7th Fleet)
Air Force	
1	HQ (5th Air Force)
1	FTR WING with: 2 FTR SQN with a total of 18 F-16 Fighting Falcon
1	FTR WING with: 1 AEW SQN with 2 E-3B Sentry 1 SAR SQN with 8 HH-60G Pave Hawk 2 FTR SQN with a total of 24 F-15C/D Eagle 1 LIFT WING with 10 C-130H Hercules 2 C-12J
Marines	
1	DIV (3rd)
1	FTR SQN with 12 F/A-18D Hornet
1	TKR SQN with 12 KC-130J Hercules
2	SPT HEL SQN with 12 CH-46E Sea Knight
1	SPT HEL SQN with 12 MV-22B Osprey
3	SPT HEL SQN with 10 CH-53E Sea Stallion
1	SPEC OPS GRP

ROK

Quantity	Role
Army	
1	HQ (8th Army)
1	HQ (2nd Inf Div)
1	HBCT
1	HVY CBT AVN BDE
1	ARTY (fires) BDE
1	AD BDE
Air Force	
1	HQ (7th Air Force)
1	FTR Wing, with
	1 FTR SQN with 20 F-16C/D Fighting Falcon 1 FTR SQN with 12 A-10 Thunderbolt II 12 OA-10 Thunderbolt II
1	FTR Wing, with
	1 FTR SQN with 20 F-16C/D Fighting Falcon 1 SPEC OPS SQN

Based primarily on material in International Institute for Strategic Studies, *The Military Balance 2011* (London: Routledge, 2011). Figures do not include equipment used for training purposes. All equipment figures represent equipment in active service.

Section 4: Special, Asymmetric, and Paramilitary Forces

The DPRK and ROK have long competed in creating effective special and paramilitary forces, and Pyongyang has developed major capabilities for unconventional warfare in the border/DMZ area and to attack deep into the ROK. The DPRK also has mixed attacks by covert and special forces with limited naval and artillery strikes, while using missile and nuclear tests to obtain asymmetric leverage.

There are many chronologies of this kind of low-level political-military conflict. The British newspaper, the *Guardian*, published the following summary on major incidents on November 23, 2010:[26]

- 27 July 1953: The Korean war ends in a truce is signed by a representative of the US-backed UN forces, and a representative of North Korea and allied Chinese forces. South Korea was not a signatory. There is no formal peace treaty, meaning the two countries remain technically at war. The Korean war cost 2 million lives.
- January 1968: North Korean commandos launch a failed assassination attempt on then president of South Korea, Park Chung-hee.
- 15 August 1974: Another assassination attempt on Park Chung-hee, by a North Korean agent in Seoul. Park survives, but his wife is killed.
- 9 October 1983: North Korean agents strike at the area of a visit by South Korean president Chun Doo-hwan to Burma, killing more than 20 people including four South Korean cabinet ministers. The president escapes.
- 29 November 1987: North Korea blows up a South Korean civilian airliner, killing 115 people. The US decides to include the North on its list of countries that support terrorism.
- 1991: North and South Korea become members of the UN.
- September 1996: A North Korean submarine lands commandos on the South Korean coast.
- June 2000: North Korean leader Kim Jong-il and South Korean president Kim Dae-jung meet in Pyongyang.
- January 2002: The then US president, George Bush, makes his "axis of evil" speech, which includes North Korea and links it to Iran and Iraq.
- February 2005: North Korea claims to have built nuclear weapons.
- July 2006: North Korea test-fires medium- and long-range missiles.
- 9 October 2006: An international outcry North Korea's first nuclear test. The UN sets up a series of sanctions.
- November 2007: The prime ministers of the two Koreas meet for the first time in 15 years.
- March-May 2008: North Korea test-fires short-range missiles.
- July 2008: A North Korean soldier shoots and kills a South Korean tourist in the Mount Kumgang resort.

[26] "Timeline: North Korea – Key Events since the end of the Korean War," *The Guardian,* November 23, 2010. Available at http://www.guardian.co.uk/world/2010/nov/23/timeline-north-korea-south-korea?intcmp=239

- April 2009: North Korea launches a long-range rocket capable of carrying a nuclear warhead. Criticism from the UN security council prompts Kim Jong-il to walk out of talks aimed at ending North Korea's nuclear program.
- May 2009: North Korea announces it has successfully conducted a second nuclear test, sparking an emergency meeting of the UN Security Council. It also withdraws from the 1953 armistice that ended the war between the two Koreas.
- November 2009: Shots are exchanged near the Yellow Sea border for the first time in seven years.
- January 2010: North Korea fires artillery near its disputed maritime border with South Korea. South Korea returns fire, but no one is injured.
- March 2010: The South Korean warship Cheonan sinks after an unexplained explosion; 46 sailors die. A later investigation suggests the boat was sunk by a torpedo launched from a North Korean submarine.
- September 2010 : Kim Jong-un, Kim Jong-il's youngest son, gains high-powered political and military posts, fuelling speculation that he will be his father's successor.
- October 2010: North and South Korea exchange shots across the border.
- November 2010: North Korea gives a US scientist a tour of a uranium plant, sparking alarm at the sophistication of its nuclear technology.
- 23 November 2010: The North fires rounds of artillery on to an inhabited South Korean border island. South Korea scrambles its fighter jets and returns fire, saying two of its marines have been killed.

James R. Clapper, the US Director of National Intelligence, provided an official American perspective on this aspect of the balance in his testimony to the US Intelligence Community for the House Permanent Select Committee on Intelligence on February 10, 2011:

> We assess that North Korea's artillery strike on Yeonpyeong Island on 23 November was meant in part to continue burnishing successor-designate Kim Jong Un's leadership and military credibility among regime elites, although other strategic goals were also factors in the attack. Kim Jong Il may feel the need to conduct further provocations to achieve strategic goals and portray Jong Un as a strong, bold leader, especially if he judges elite loyalty and support are in question.
>
> Kim Jong Il has advanced preparations for his third son to succeed him, by anointing him with senior party and military positions, promoting probable key supporting characters, and having the younger Kim make his first public appearances. These steps strengthened the prospects for the 27- year old Jong Un to develop as a credible successor, but the succession process is still subject to potential vulnerabilities, especially if Kim Jong Il dies before Jong Un consolidates his authority.
>
> …the Korean People's Army remains a large and formidable force capable of defending the North. Also, as demonstrated by North Korean attacks on the South Korean ship *Cheonan* in March 2010 and Yeongpyong Island in November. North Korea is capable of conducting military operations that could potentially threaten regional stability. These operations provide Pyongyang with what the regime may see as a means to attain political goals through coercion.

Special and Asymmetric Forces

An unclassified estimate of the Special and Unconventional Forces on each side is shown in **Figure 4.1**. The forces in Figure 4.1 would be supplemented by similar US forces, but no detailed estimate is available. They create a major "wild card" in assessing the region. Not only do they make it difficult to assess probable scenarios, but any limits that might be placed on more conventional forces expand their relative utility, and it would be difficult – at best – to assess any meaningful arms control options affecting special forces.

The DPRK and ROK balance is also sharply affected by two unique aspects of DPRK forces that are summarized in **Figures 4.2 and 4.3**.

- **Figure 4.2** provides an unclassified estimate of a tunnel system that the DPRK has built up to allow it to make rapid, surprise attacks and the bulk of its forces are concentrated near the DMZ.
- **Figure 4.3** provides a similar description of the massive artillery attack system that could deliver massive fire to both aid in an invasion and attack South Korea's capital at Seoul.

These capabilities are highly destabilizing and could lead to rapid escalation in war. They also present a problem for arms control, unless they can be largely eliminated, since they give the DPRK a major advantage in threatening and attacking the ROK that would be enhanced by any general reduction in conventional forces.

Paramilitary, Police, and Internal Security Forces

Paramilitary, police, and internal security forces play an important role in the balance. The size of each country's paramilitary forces is summarized in **Figure 4.4.** It is harder to estimate the size and role of internal security forces, although these can play a major role in securing rear areas, and forcing soldiers to fight. The US State Department annual country reports on human rights do, however, provide a Western assessment of some aspects of such capabilities.

- **Figure 4.5** summarizes the role of such forces in the DPRK**.**
- **Figure 4.6** summarizes the role of such forces in ROK**.**

These assessments reflect a Western viewpoint. It was not possible to find comparable assessments that reflect a DPRK view. Once again, it is also important to note that the DPRK may see its choices as forced upon it by outside threats and pressures. At the same time, these differences between the DPRK and the ROK act as a warning that the internal security structures of each state show differences that reflect their ability and willingness to use force and to escalate.

Figure 4.1: Northeast Asian Special Forces[27]

Democratic People's Republic of North Korea (DPRK)[28]

The 2010 South Korean Defense White Paper notes an increase in DPRK Special Forces to 200,000 in 2010 from 180,000 in 2008.[29]

According to ROK intelligence sources, the KPA's formidable special operations force (SOF), one of the largest in the world, includes approximately 180,000 personnel. US sources credit the KPA with only 80,000 SOF troops. The discrepancy arises from the fact that ROK estimates include light infantry units organic to divisions and corps, as well as infantry units converted to light infantry, while the US figures do not.

This force is organized into seven light infantry divisions, approximately 25 special forces brigades (12 light infantry/mechanized light infantry, three reconnaissance brigades, three airborne brigades, two air force sniper brigades, two navy sniper brigades and three sniper brigades) and between five and seven reconnaissance battalions. Additionally, infantry divisions have an organic light infantry battalion or regiment. Sniper units are alternately identified as 'sharpshooter'.

The Light Infantry Training Guidance Bureau is the primary organization within the KPA tasked with the training and conducting of unconventional and special warfare operations. During peacetime it is believed to exercise administrative control over all special operations units, including those of the KPAF, KPN and Reconnaissance General Bureau. During wartime it will function as the primary headquarters co-coordinating all special operations.

Beginning in 2000 but more significantly from 2003 to the present, the KPA has undertaken a number of significant organizational changes within its ground forces units. Among the more significant changes was the expansion of existing division level light infantry battalions within the DMZ corps to regiments and the reorganization of seven infantry or mechanized infantry divisions (approximately 50,000 troops) into light infantry divisions. These later organizational developments were apparently achieved by stripping these divisions of the majority of their combat and combat support units (for example artillery, armor, air defense and so on). Accompanying these organizational developments was the expansion of urban, nighttime and mountaineering training for all special operations units.

It is believed that the KPA undertook these changes to organization and training following a strategic review of a future conflict on the Korean Peninsula, combined with lessons learned from the recent conflicts in the Balkans, Iraq and Afghanistan, which convinced the KPA of the need for a greater number of "light" units. This is possibly one of the most interesting developments in KPA conventional forces in the past 20 years. Additionally, some light infantry battalions within divisions deployed along the DMZ were expanded to regiment size.

On paper the KPA has the capability to transport approximately 19,000 troops (4,000 by air and 15,000 by sea) at once. With the economic troubles during the past 15 years, and the resulting decline in KPAF and KPN operational readiness, this lift capability may have declined by 20-40 per cent. The primary missions of these special forces are: reconnaissance, establishing a 'second front' within the ROK strategic rear, destruction and disruption of the ROK/US C4ISR structure, neutralization of ROK and US air bases, and neutralization of ROK and US missiles and weapons of mass destruction. These missions include operations against US bases in Japan.
Elements of both the Reconnaissance General Bureau and Light Infantry Training Guidance Bureau make use of specialized high-speed semi-submersible infiltration landing craft (SILC), Hugo and Yen-class SSM and Sang-o SSC.

The KPA takes great pride in its special operations forces, which are frequently identified as the "invincibles" (in the air force), "human bombs protecting the center of the revolution" (in the army) and "human torpedoes" (in the navy)

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[27] **Note:** Due to secrecy and limited open source information, all available personnel figures are rough estimates.
[28] IHS Jane's: Defence & Security Intelligence Analysis. "Jane's World Armies: North Korea." IHS Jane's, Jan. 20, 2011 www.janes.com Jan. 21, 2011.
[29] Republic of Korea Ministry of Defense, *2010 Defense White Paper*.

Japan[30]

The Special Operations Group (SOG), consisting of 300 personnel, was established in early 2004 at Narashino Camp, 30 km west of Tokyo. Its main mission is to capture or destroy enemy special forces after an initial force of regular infantry is deployed to establish a perimeter around the intruding force. Mobility for the SOG is provided by the 1st Helicopter Brigade stationed near Narashino. Its troops could also be deployed by parachute drops from C-130 transport aircraft. Personnel are trained at specialized facilities for military operations in urban terrain, together with close-combat techniques in mountainous areas.

The 640-strong Western Army Infantry Regiment, established at Ainoura Camp in Nagasaki prefecture in March 2002, was created to deal with an increasing number of offshore penetrations of Japanese territorial waters. The unit conducts reconnaissance activities around the roughly 180 isolated isles within the Western Army's jurisdiction and makes provision against armed guerrilla attacks. The regiment consists of four companies, and each now includes one ranger platoon. This is the first time that the GSDF has integrated units with specialized capabilities within its regular forces, and it has so far shied away from forming fully-fledged ranger formations after the US model.

GSDF Special Forces units consist of the Central Readiness Force (Chuo Sokuo Shudan), the Special Operations Group (Tokushu Sakusen Gun), the 1st Airborne Brigade, the Tsushima Guardian Unit, the Western Army Infantry Regiment (Seibu Homen Futsu-ka Rentai) and one Ranger Platoon.

China[31]

Army Special Forces are receiving a substantial investment, with at least one dedicated unit assigned to each MR. Airborne and Marine forces also appear to have their own Special Forces contingents. Special Forces will be used extensively in the early stages of a conflict to attack key personnel and infrastructure targets, and to secure air and naval facilities to allow for follow-on forces. Chosen for their stamina, Special Forces troops are trained in many skills, and are able to operate a wide range of Chinese and foreign weapons. Some specialized weapons for Special Force include a range of crossbows for silent attack. The PLA has also revealed a new rifle-size laser device, which can be used to cue laser-guided bombs or for non-lethal anti-personnel purposes.

Republic of Korea (ROK)[32]

The ROK's special operations forces number no more than 20,000 individuals. However, they amount to a formidable, well-trained set of units that are largely modeled on their US equivalents and use primarily US equipment.

The ROK's Army, Navy, Air Force, and Marine Corps all employ special operations units. The largest unit is the Army Special Warfare Command (SWC). About 10,000 SWC troops are tasked with infiltrating deep behind enemy lines for reconnaissance and surveillance, destruction of key military facilities, sabotage, and kidnapping enemy VIPs. Additionally, they combat terrorism, protect VIPs, and carry out top-secret operations. Furthermore, the SWC also has brigades whose specific duty is to engage and eliminate the DPRK's light infantry troops if they infiltrate the ROK.

The SWC must also contend with a number of potential "wild-card" scenarios, including DPRK terrorist actions, threats of the use of WMD, missile launches, and other forms of provocation to gain political and economic concessions. It must also be prepared to deal with other potential crises that include a massive refugee flow, natural or manmade disasters, the transfer or loss of control of WMD, an outbreak of civil war within the DPRK, and the collapse of the DPRK itself.

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[30]IHS Jane's: Defence & Security Intelligence Analysis. "Jane's World Armies: Japan." IHS Jane's, Nov. 12, 2010 www.janes.com Jan. 21, 2011.

[31]IHS Jane's: Defence & Security Intelligence Analysis. "Jane's World Armies: China." IHS Jane's, Oct. 15, 2010 www.janes.com Jan. 21, 2011.

[32] "Spotlight on S. Korea's Special Forces." *The Chosun Ilbo* (English Edition) (24 Jan 2011) http://english.chosun.com ; "S. Korea's Special Forces 'Vastly Outnumbered' by N. Korea's." *The Chosun Ilbo* (English Edition) (6 Jan 2011) http://english.chosun.com; "History of Special Operations Command Korea" United States Eight Army Website (2010) http://8tharmy.korea.army.mil/.

If open hostilities between the ROK and the DPRK resume, the SWC will combine with the US Special Operations Command Korea (SOCKOR) located at Camp Kim in Yongsan forming the Combined Unconventional Warfare Task Force (CUWTF). The CUWTF will plan and conduct combined special operations throughout the Korean Theater of Operations.

The ROK Navy's UDT/SEAL unit is modeled after the US' UDT. Like its counterpart in the US, the unit is famous for its intensive training. As evidenced in its flawless raid which led to the rescue of 21 crewmembers of the *Samho Jewelry* after the ship was hijacked by Somali pirates on January 15, 2010, the force is extremely well trained and competent. The operation ultimately resulted in all of the crewmembers of the ship being rescued, while eight pirates were killed and five were taken prisoner

The ROK Air Force's Combat controllers are another elite troop of the military. During wartime, they too infiltrate behind enemy lines ahead of airborne troops or airlift operations to guide planes so they can accurately drop troops and equipment to positions on the ground.

Figure 4.2 DPRK Infiltration Routes: Tunnels

There are a number of different estimates of the efforts the DPRK has made to create tunnels under the DMZ. Work by Jane's and GlobalSecurity.org notes that the DPRK has created a series of infiltration tunnels under the DMZ since the 1970s, four of which have been discovered by US and ROK forces (see table below). Each uncovered shaft was large enough to permit the passage of an entire infantry division in one hour, though the tunnels were not wide enough for tanks or vehicles. All the tunnels ran in a north-south direction and did not have branches, and, with each discovery, engineering within the tunnels has become progressively more advanced.[33]

	Tunnel No 1	**Tunnel No 2**	**Tunnel No 3**	**Tunnel No 4**
Location:	8 km northeast of Korang'po	13 km north of Ch'orwan	4 km south of P'anmunjon	26 kilometers northeast of Yanggu
Invasion route:	Korang'po-Uijongbu-Seoul	Ch'orwon-P'och'on-Seoul	Munsan-Seoul	Sohwa-Wontong-Seoul
Troop capacity:	4,000/h *	8,000/h	8,000/h	8,000/h
Total length:	3.5 km	3.5 km	1.64 km	2.05 km
Length south of Military Demarcation Line:	1,000 m	1,100 m	435 m	1,030
Depth below surface:	45 m	50-160 m	73 m	145 m
Discovery Date:	November 1974	March 1975	October 1978	March 1990

* This tunnel has concrete lining.
IHS Jane's: Defence & Security Intelligence Analysis. "Jane's World Armies: North Korea." Jan. 20, 2011 www.janes.com.

According to North Korean defectors, Kim Il-Sung issued a sweeping order in the early 1970s that required every Korean People's Army division along the DMZ to dig and maintain at least two tunnels into South Korea.[34] The existence of such tunnels was reported by Jane's via an engineer from the Korean people's Army (KPA) that defected in 1974.[35] These reports were confirmed in late November 1974 when an ROK Army patrol stumbled upon a DPRK tunnel, complete with reinforced concrete slabs, electric power and lighting, weapons storage, sleeping areas and a narrow gauge railway with carts.[36] Its size was about three feet by four feet and, though of undetermined length, the tunnel was estimated to be large enough to hide an entire infantry regiment—or to funnel thousands of soldiers into the South in short order.[37] Another tunnel was discovered in March 1975. It measured 3300 meters long, and, as Jane's reports, 1100 meters of it extended into ROK territory. It was dug at a depth of between 50 and 150 meters and measured 2m tall by 2m wide. As many as 8,000 troops may have been able to

[33] Global Security.org, "Korea Demilitarized Zone Incidents," http://www.globalsecurity.org/military/ops/dmz.htm
[34] Global Security.org, "Korea Demilitarized Zone Incidents," http://www.globalsecurity.org/military/ops/dmz.htm
[35] See IHS Jane's: Defence & Security Intelligence Analysis. "Jane's World Armies: North Korea." Jan. 20, 2011 www.janes.com.
[36] Global Security.org, "Korea Demilitarized Zone Incidents," http://www.globalsecurity.org/military/ops/dmz.htm
[37] Global Security.org, "Korea Demilitarized Zone Incidents," http://www.globalsecurity.org/military/ops/dmz.htm

move through it in an hour.[38] US and ROK forces uncovered two more tunnels in 1978 and 1990, the latter of which was 145 deep and large enough for three armed soldiers to run through side-by-side.

The US and ROK have since made constant efforts to detect any such tunnels and tunneling efforts, but it is not possible to be certain how many exist, their location, or their capacity. Jane's reports that there are approximately 20-25 such tunnels.[39] *The Los Angeles Times* agrees with Jane's, placing their estimate around twenty.[40] ROK and US abilities to detect such tunnels through advanced sensors like ground sensing radars, seismic monitors, and other devices—as well as classic measures like counter-tunneling—is unknown.

The threat posed by any remaining tunnels and their potential to insert combat forces behind the forward defenses is substantial. If North Korea does attempt a military attack upon the south, it could be that the tunnels of the Korean DMZ will play a role in that conflict.

[38] IHS Jane's: Defence & Security Intelligence Analysis. "Jane's World Armies: North Korea." IHS Jane's, Jan. 20, 2011 www.janes.com.
[39] IHS Jane's: Defence & Security Intelligence Analysis. "Jane's World Armies: North Korea." IHS Jane's, Jan. 20, 2011 www.janes.com.
[40] Barbara Demick, "Thousands of North Korean tunnels hide arms secrets," *The Los Angeles Times* (13 Nov 2003).

Figure 4.3: DPRK Artillery

The vast majority of North Korea's military equipment is outdated in comparison with that used by South Korean and US forces, but the North Korean People's Army often substitutes numbers and "mass" for modernization and quality. There are reports that the KPA has created thousands of artillery emplacements near the DMZ that are capable of inflicting significant damage and civilian casualties on Seoul. US General Walter Sharp, commander of US troops in South Korea, said the North has "an old but very large military that is positioned in a very dangerous place, very close" to South Korea.[41] In addition to its ballistic missiles, reports indicate that the KPA has approximately 8,500 artillery pieces (and 5,100 MRLs), the majority of which are located along the DMZ in natural caves, man-made tunnels, and bunkers (known as Hardened Artillery Sites, or HARTS).[42]

The quality of of North Korea's artillery forces and their competence is questionable. Despite North Korea's use of radar in its November 23, 2010 artillery bombardment of Yonp'yong-do island, the accuracy of the attack was poor. South Korean MND (Ministry of National Defense) sources state that the KPA (Korean People's Army) fired approximately 170 rounds at Yonp'yong-do. Of these, 90, or 53%, impacted the waters surrounding the island, while 80, or 47%, impacted on the island.[43] Although inconclusive, the poor accuracy suggests that despite their pre-attack planning and exercises, KPA artillery troops—at least those in the IV Corps—are in need of greater training. Additionally, MND sources claim that approximately 25% of the 80 rounds that impacted the island were duds and failed to detonate on impact (12% if the total of 170 is taken into consideration).[44] This high failure rate suggests that some DPRK-manufactured artillery munitions, especially MRL rounds, suffer from either poor quality control during manufacture or that storage conditions and standards are poor.

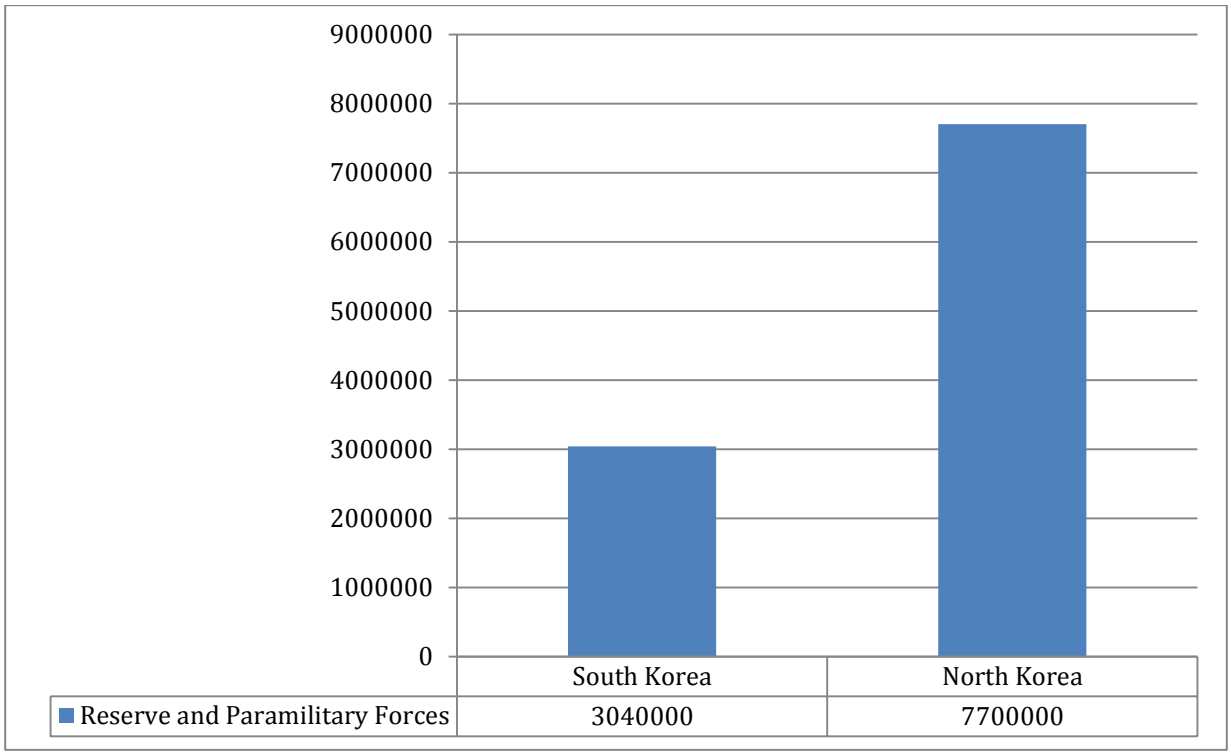
Despite the apparent lack in quality of DPRK artillery platforms, a DPRK artillery attack on the ROK would most likely be devastating, especially in the environs surrounding Seoul. Lee Yang Ho, ROK defense minister during the 1994 nuclear crisis, said one computer simulation conducted during his term projected 1 million dead; "all industry would be destroyed, gas stations, power plants. This is such a densely populated area that even if North Korean artillery were not very accurate, anyplace you would hit there would be huge numbers of casualties."[45]

Hypothetical Range of 170mm and 240mm DPRK Artillery

North Korea deploys more multiple-launch rockets," *Yonhap News Agency*, December 3, 2010. Available at http://english.yonhapnews.co.kr/national/2010/12/02/9/0301000000AEN20101202009300315F.HTML

[41] "N. Korea Has World's Largest Artillery Force: US," American Foreign Press (24 April 2009).
[42] *South Korea Ministry of Defense*, 2010 Defense White Paper.
[43] Joseph S. Bermudez Jr., "The Yonp'yong-do Attack, November 23, 2010, Pt II," *KPA Journal*, Vol. 1, No. 12.
[44] Ibid
[45] Barbara Demick, "Seoul's Vulnerability Is Key to War Scenarios," *Los Angeles Times* (27 May 2003).

Figure 4.4: Reserve and Paramilitary Forces



Based primarily on material in Republic of Korea Ministry of National Defense, *2008 Defense White Paper*. Available at http://www.mnd.go.kr/mndEng_2009/main/index.jsp. Personnel figures are estimates.

DPRK Reserve and Paramilitary Units

RMTU	620,000	Subject to combat mobilization (men and single women between ages of 17 and 30)
Worker and Peasant Red Guard	5,720,000	Equivalent to ROK's Homeland Reserve Forces
Red Youth Guards	940,000	Military organization of high/middle school students
Paramilitary Units	420,000	Includes Security Guard Command, Ministry of People's Security (includes 115,000 Border Guards), Logistics Mobilization Guidance Bureau, Speed Battle Youth Shock Troops

Based primarily on material in Jane's World Armies, *North Korea*, January 20, 2011; Republic of Korea Ministry of National Defense, *2008 Defense White Paper*. Personnel figures are estimates.

Figure 4.5: Internal Security Portions of US State Department Human Rights Report: Democratic People's Republic of Korea[46]

The Democratic People's Republic of Korea (DPRK or North Korea) is a dictatorship under the absolute rule of Kim Jong-il, general secretary of the Korean Workers' Party (KWP) and chairman of the National Defense Commission (NDC), the "highest office of state." The country has an estimated population of 23.5 million. Kim's father, the late Kim Il-sung, remains "eternal president." National elections held in March were not free or fair. There was no civilian control of the security forces, and members of the security forces committed numerous serious human rights abuses.

… Citizens did not have the right to change their government. The government subjected citizens to rigid controls over many aspects of their lives. There continued to be reports of extrajudicial killings, disappearances, arbitrary detention, arrests of political prisoners, harsh and life threatening prison conditions, and torture. There were reports that pregnant female prisoners underwent forced abortions in some cases, and in other cases babies were killed upon birth in prisons. The judiciary was not independent and did not provide fair trials. Citizens were denied freedom of speech, press, assembly, and association, and the government attempted to control all information. The government restricted freedom of religion, citizens' movement, and worker rights. There continued to be reports of severe punishment of some repatriated refugees. There were widespread reports of trafficking in women and girls among refugees and workers crossing the border into China.

…There were numerous reports that the government committed arbitrary and unlawful killings. Defector and refugee reports indicated that in some instances the government executed political prisoners, opponents of the regime, repatriated defectors, and others accused of crimes with no judicial process. The law prescribes the death penalty for the most "serious" or "grave" cases of "antistate" or "antination" crimes, including: participation in a coup or plotting to overthrow the state; acts of terrorism for an antistate purpose; treason, which includes defection or handing over state secrets; suppressing the people's movement for national liberation; cutting electric power lines or communication lines; and illegal drug transactions. A 2007 addendum to the penal code extended executions to include less serious crimes such as theft or destruction of military facilities or national assets, fraud, kidnapping, smuggling, and trafficking, Republic of Korea (ROK or South Korea) NGOs and think tanks reported.

In the past border guards reportedly had orders to shoot to kill potential defectors, and prison guards were under orders to shoot to kill those attempting to escape from political prison camps, but it was not possible to determine if this practice continued during the year. During the year the security forces announced that attempting to cross the border or aiding others in such an attempt was punishable by execution. Religious and human rights groups outside the country alleged that some North Koreans who had contact with foreigners across the Chinese border were imprisoned or killed.

Press and South Korean NGOs reported that public executions were on the rise, but no statistics were available to document the reported trend.

In February 2009 two officials from the Ministry of Electric Industry were reportedly executed for "shutting down the electricity supply" to the Sunjin Steel Mill in Kimchaek, North Hamkyung Province (see section 4). In June the navy allegedly killed three persons fleeing to South Korea on a small boat (see section 2.d.).

In March after the 2009 currency revaluation, international press reported a man was shot and killed for treason for burning his money, which bore a picture of Kim Il-sung, instead of giving it to the government.

Also in June 2009 an NGO reported four inmates and a guard at Yodok prison camp were killed following a gas explosion. The incident reportedly occurred while five workers were unloading drums of gasoline. Two of the prisoners reportedly died in the explosion, and guards shot and killed two others. The guard on night duty who survived the accident reportedly was sentenced to death.

An NGO reported that in June 2009 four soldiers beat and killed a security guard after he refused to give them the potatoes he was guarding. Security agents reportedly arrested the soldiers. There was no additional information available regarding the soldiers' status at year's end.

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[46] "2010 Human Rights Report: Democratic People's Republic of Korea," US Department of State (11 April 2011) http://www.state.gov.

Press and NGOs reported the execution of officials, including Park Nam-ki, director of planning and finance, reportedly for initiating the November 2009 currency reform policy (see section 2.e.). This report has not been confirmed.

It was unknown whether the government prosecuted or otherwise disciplined members of the security forces for killings that occurred in 2008, including the July 2008 shooting by security forces that killed a visiting South Korean tourist who strayed outside the boundary of the Mt. Kumgang Tourism Park.

During the year the brother of Son Jong-nam reported he believed that in December 2008 officials executed Son Jong-nam, who was sentenced to death in 2006 for maintaining contacts with organizations outside the country.

Role of the Police and Security Apparatus

….The internal security apparatus includes the Ministry of Public Security (MPS) and the State Security Department (SSD). Corruption in the security forces was endemic. The security forces do not have adequate mechanisms to investigate possible security force abuses.

The country has an estimated 1.1 million active duty military personnel, in addition to a reserve force of approximately three million. The military conscripts citizens into military service at age 17, and they serve for four to 10 years.

The formal public security structure was augmented by a pervasive system of informers throughout the society. Surveillance of citizens, both physical and electronic, also was routine.

The MPS, responsible for internal security, social control, and basic police functions, is one of the most powerful organizations in the country and controlled an estimated 144,000 public security personnel. It maintains law and order; investigates common criminal cases; manages the prison system and traffic control; monitors citizens' political attitudes; conducts background investigations, census, and civil registrations; controls individual travel; manages the government's classified documents; protects government and party officials; and patrols government buildings and some government and party construction activities. Border Guards are the paramilitary force of the MPS and are primarily concerned with monitoring the border and with internal security.

In 2008 one South Korean NGO reported that the role of the police increased significantly. The increased responsibility reportedly caused tension between the police and the military.

Disappearance

Reports indicated the government was responsible for disappearances. In recent years defectors claimed that state security officers often apprehended individuals suspected of political crimes and sent them, without trial, to political prison camps. There are no restrictions on the ability of the government to detain and imprison persons at will and to hold them incommunicado. The penal code states that a prosecutor's approval is required to detain a suspect; however, the government ignored this law in practice.

In June 2010 international press reported the disappearance of Ri Je Gang, a first deputy director of the Workers Party's Organization and Guidance Department. North Korea's news media reported that Ri died in a car accident; international press reported speculation that Ri's death was possibly the result of an internal power struggle.

In February 2009 foreign media reported that female prisoners in prison camps who were impregnated by guards disappeared shortly after the pregnancy was discovered.

In February 2009 foreign media reported that female prisoners in prison camps who were impregnated by guards disappeared shortly after the pregnancy was discovered.

There were no new developments in the 2008 report of disappearance of 22 North Koreans who were repatriated after floating into South Korean waters.

Japan continued to seek further information about the cases of 12 Japanese nationals whom the Japanese government designated as having been abducted by DPRK government entities. The DPRK did not announce any progress or results of an investigation it agreed to reopen after discussions with the Japanese government in 2008. Japan also hoped to gain answers regarding other cases of suspected abductions of Japanese nationals.

ROK government and media reports indicated that the DPRK government also kidnapped other nationals from

locations abroad in the 1970s and 1980s. However, the DPRK government continued to deny its involvement in the kidnappings. The ROK government estimated that approximately 480 of its civilians, abducted or detained by DPRK authorities since the end of the Korean War, remained in the DPRK. The ROK government estimated 560 South Korean prisoners of war and soldiers missing in action also remained alive in North Korea.

In 2008 the media reported South Korean missionary Kim Dong-shik had most likely died within a year of his 2000 disappearance near the China-DPRK border.

Torture and Other Cruel, Inhuman, or Degrading Treatment or Punishment

The penal code prohibits torture or inhuman treatment; however, many sources continued to report these practices. Methods of torture and other abuse reportedly included severe beatings, electric shock, prolonged periods of exposure to the elements, humiliations such as public nakedness, confinement for up to several weeks in small "punishment cells" in which prisoners were unable to stand upright or lie down, being forced to kneel or sit immobilized for long periods, being hung by the wrists or forced to stand up and sit down to the point of collapse, and forcing mothers recently repatriated from China to watch the infanticide of their newborn infants. Defectors continued to report that many prisoners died from torture, disease, starvation, exposure to the elements, or a combination of these causes.

…The North Korean Human Rights Database Center's *2010 White Paper on North Korean Human Rights* indicated that officials have in some cases prohibited live births in prison and ordered forced abortions, particularly in detention centers holding women repatriated from China, according to first-hand refugee testimony. In some cases of live birth, the white paper reported that prison guards killed the infant or left it for dead. Guards also sexually abused female prisoners according to the white paper.

Defectors reported that reeducation through labor, primarily through sentences at forced labor camps, was a common punishment and consisted of tasks such as logging, mining, or tending crops under harsh conditions. Reeducation involved memorizing speeches by Kim Il-sung and Kim Jong-il.

Prison and Detention Center Conditions

NGO, refugee, and press reports indicated that there were several types of prisons, detention centers, and camps, including forced labor camps and separate camps for political prisoners. Defectors claimed the camps covered areas as large as 200 square miles and contained mass graves, barracks, worksites, and other prison facilities. *Witness to Transformation* described four main types of prison and detention facilities: kwan-li-so, political penal-labor camps; kyo-hwa-so, correctional or reeducation centers; jip-kyul-so, collection centers for low-level criminals; and ro-dong-dan-ryeon-dae, labor-training centers. One kwan-li-so camp, Camp 22, is estimated to be 31 miles long and 25 miles wide and to hold 50,000 inmates. Defectors claimed the kwan-li-so camps contained unmarked graves, barracks, worksites, and other prison facilities. The *Washington Post* reported in July 2009 that numerous prison camps can be seen in satellite images and that the camps have been consolidated from 14 locations to five. An NGO reported six major prison camp complexes across the country. Kwan-li-so penal labor camps are administered by the National Security Agency (NSA); kyo-hwa-so reeducation centers are administered by the People's Safety Agency (PSA). An NGO reported six kwan-li-so facilities: Kaecheon (No.14) and Bukchang (No.18) in South Pyongan Province, Yoduk (No.15) in South Hamkyung Province, and Hwasung (No.16), Chongjin (No.25), and Hoiryeong (No.22) in North Hamkyung Province as North Korea's six remaining political prison camps.

Reports indicated that those sentenced to prison for nonpolitical crimes were typically sent to reeducation prisons where prisoners were subjected to intense forced labor. They stated that those who were considered hostile to the regime or who committed political crimes, such as defection, were sent to political prison camps indefinitely. Many prisoners in political prison camps were not expected to survive. The government continued to deny the existence of political prison camps.

Reports indicated that conditions in the political prison camps were harsh and that systematic and severe human rights abuses occurred throughout the prison and detention system. Detainees and prisoners consistently reported violence and torture. According to refugees, in some places of detention, prisoners received little or no food and were denied medical care. Sanitation was poor, and former labor camp inmates reported they had no changes of clothing during their incarceration and were rarely able to bathe or wash their clothing. An NGO reported that one reeducation center was so crowded that prisoners were forced to sleep on top of each other or sitting up. The same NGO reported that guards at a labor camp stole food brought for inmates by their family members. An NGO

reported in January 2010 unsanitary conditions, crowding of inmates, and high death rates caused by epidemics in a reeducation center.

South Korean and international press reported that kyo-hwa-so, or reeducation centers, hold populations of up to 10,000 political prisoners, economic criminals, and ordinary criminals.

During 2010 the South Korean National Human Rights Commission reported that defectors indicated that North Korean authorities selected prison inmates to spy on others and to torture other prisoners. The commission also reported that attempts to escape led to execution by firing squad or hanging.

South Korean press reported an increase in the number of inmates at a labor camp under the Ministry of People's Armed Forces in North Hamkyung Province.

The government did not permit inspection of prisons or detention camps by human rights monitors.

Arrest Procedures and Treatment While in Detention

Members of the security forces arrested and reportedly transported citizens suspected of committing political crimes to prison camps without trial. According to one South Korean NGO, beginning in 2008 the People's Safety Agency was authorized to handle directly criminal cases without approval of prosecutors. Previously, once police officers arrested suspects, the preadjudication department examined facts and evidence of the case and passed the case to prosecutors. It was not until the completion of prosecutors' investigation that the court made an official decision on the case. The change was made reportedly because of corruption among prosecutors.

Witness to Transformation reported that authorities had a high level of discretion in detaining, arresting, prosecuting, and releasing people.

There were no restrictions on the government's ability to detain and imprison persons at will or to hold them incommunicado. Family members and other concerned persons found it virtually impossible to obtain information on charges against detained persons or the lengths of their sentences. Judicial review of detentions did not exist in law or in practice.

In January 2009 the Sooseong Reeducation Center reportedly doubled the sentences of inmates near the end of their three- and four-year terms. In March a ROK national was apprehended at the Kaesong Industrial Complex and detained for four months without being allowed to speak with ROK government officials.

Political Prisoners and Detainees

…While the total number of political prisoners and detainees remained unknown, a 2003 report by the US Committee for Human Rights in North Korea, *The Hidden Gulag*, reported an estimated 150,000 to 200,000 persons were believed to be held in a type of political prison camps known as kwan li so. The government considered critics of the regime to be political criminals. Reports from past years described political offenses as including sitting on newspapers bearing Kim Il-sung's or Kim Jong-il's picture, mentioning Kim Il-sung's limited formal education, or defacing photographs of the Kims.

Freedom of Movement, Internally Displaced Persons, Protection of Refugees, and Stateless Persons

…The law provides for the "freedom to reside in or travel to any place"; however, the government did not respect this right in practice. During the year the government continued to attempt to control internal travel. The government did not cooperate with the Office of the UN High Commissioner for Refugees and other humanitarian organizations in providing protection and assistance to internally displaced persons, refugees, returning refugees, asylum seekers, stateless persons, and other persons.

The government continued to restrict the freedom to move within the country. Only members of a very small elite class and those with access to remittances from overseas had access to personal vehicles, and movement was hampered by the absence of an effective transport network and by military and police checkpoints on main roads at the entry to and exit from every town. Use of personal vehicles at night and on Sundays was restricted. An NGO reported that in the provinces along the Chinese border, persons traveling without authorization papers were arrested and fined 100,000 won (approximately $700). (Note: the government revalued its currency on November 30. Approximations in this report are based on the prerevalued rates.)

The government strictly controlled permission to reside in, or even to enter, Pyongyang, where food supplies, housing, health, and general living conditions were much better than in the rest of the country. Foreign officials visiting the country observed checkpoints on the highway leading into Pyongyang from the countryside.

The government also restricted foreign travel. The regime limited issuance of exit visas for foreign travel to officials and trusted businessmen, artists, athletes, academics, and religious figures. Short-term exit papers were available for some residents on the Chinese border to enable visits with relatives or to engage in small-scale trade.

It was not known whether the laws prohibit forced exile; the government reportedly forced the internal exile of some citizens. In the past the government engaged in forced internal resettlement of tens of thousands of persons from Pyongyang to the countryside. Sometimes this occurred as punishment for offenses, although there were reports that social engineering was also involved. For example, although disabled veterans were treated well, other persons with physical and mental disabilities, as well as those judged to be politically unreliable, were sent out of Pyongyang into internal exile.

The government did not allow emigration, and beginning in 2008 it tightened security on both sides of the border, which dramatically reduced the flow of persons crossing into China without required permits. NGOs reported strict patrols and surveillance of residents of border areas and a crackdown on border guards who may have been aiding border crossers. According to an NGO, on February 10, 2009, a navy patrol boat captured a fishing boat that crossed into international waters; they arrested the captain and crew for attempting to flee to South Korea. Authorities reportedly beat one crewmember to death during a preliminary hearing. Six crewmembers were released, but five, including the captain, remained in custody.

Substantial numbers of citizens have crossed the border into China over the years, and NGO estimates of those who lived there during 2009 ranged from tens of thousands to hundreds of thousands. Some settled semi permanently in northeastern China, others traveled back and forth across the border, and others sought asylum and permanent resettlement in third countries. A few thousand citizens gained asylum in third countries during the year. The law criminalizes defection and attempted defection, including the attempt to gain entry to a foreign diplomatic facility for the purpose of seeking political asylum. Individuals who cross the border with the purpose of defecting or seeking asylum in a third country are subject to a minimum of five years of "labor correction." An NGO reported that minors over age 14 found crossing the border were tried as adults. In "serious" cases defectors or asylum seekers are subject to indefinite terms of imprisonment and forced labor, confiscation of property, or death. Many would-be refugees who were returned involuntarily were imprisoned under harsh conditions. Some sources indicated that the harshest treatment was reserved for those who had extensive contact with foreigners. In the past, reports from defectors indicated that the regime differentiated between persons who crossed the border in search of food (who might be sentenced only to a few months of forced labor or in some cases merely issued a warning) and persons who crossed repeatedly or for political purposes (who were sometimes sentenced to heavy punishments). The law stipulates a sentence of up to two years of "labor correction" for the crime of illegally crossing the border.

During 2009 the government reportedly continued to enforce the policy that all border crossers be sent to prison or reeducation centers.

A February 2010 decree by the MPS made special stipulations against defectors, increasing the charge to a "crime of treachery against the nation," possibly punishable by execution. This decree coincided with NGOs' reports of a "50-Day Battle" to wipe out potentially hostile forces of unrest, increasing scrutiny of and punishments for possessing Chinese cell phones and South Korean videos, and preventing defections. Security increased along border areas, and the South Korean press reported increased house searches.

South Korean press reported that the government issued orders for guards to shoot to kill attempted border crossers. South Korean press reported that five North Koreans were shot dead on the Chinese side of the border and two others wounded by North Korean border guards after they crossed the Apnok River on December 14, 2010.

Witness to Transform reported that approximately one-quarter of defectors who had successfully escaped North Korea surveyed in 2004 reported having been arrested in China and repatriated to North Korea at least once before their successful departure.

Figure 4.6: Internal Security Portions of US State Department Human Rights Report: Republic of Korea[47]

The Republic of Korea (Korea or ROK) is a constitutional democracy governed by President Lee Myung-bak and a unicameral legislature. The country has a population of approximately 48 million. In April 2008 the Grand National Party obtained a majority of National Assembly seats in a free and fair election. Civilian authorities maintained effective control of the security forces.

The following human rights problems were reported: hazing of military personnel, imprisonment of conscientious objectors, the government's interpretation of laws regulating the Internet and telecommunications, and sexual and domestic violence.

The government generally respected the human rights of its citizens; however, there were problems in some areas. Women, persons with disabilities, and minorities continued to face societal discrimination. Rape, domestic violence, and child abuse remained serious problems.

…There were no reports that the government or its agents committed arbitrary or unlawful killings. Official figures indicated that hazing was a factor in many of the 356 suicides by military personnel since 2004.

…There were no reports of politically motivated disappearances.

Prison and Detention Center Conditions

Prison and detention center conditions generally met international standards. The government permitted monitoring visits by independent human rights observers, and such visits occurred during the year.

In December 2008 the government passed the Act on Sentence Execution and Treatment of Detainees, a new petition system that better accommodates detainees who want to formally accuse prison officials of abuse. The system provides detainees easier access to petition procedures and assists with the petition process, whereas before, petitioners had to submit their grievances directly to the Ministry of Justice (MOJ) with limited support mechanisms. Prisoners can petition the Ministry of Justice's Human Rights Violations Center or the National Human Rights Commission (NHRC) to make prison abuse claims. During the year 300 petitions were submitted to the justice minister, of which 64 were under investigation. Of the 67 filed with the Human Rights Violations Center, five resulted in findings of relief for the petitioners. The International Committee of the Red Cross, which maintains an office in Seoul, did not request prison visits during the year.

The MOJ reported the total of number of prisoners as of December 2010 was 45,681, of whom 2,375 were women and 430 were juveniles.

Arbitrary Arrest or Detention

…The law prohibits arbitrary arrest and detention, and the government generally observed these prohibitions. However, the National Security Law (NSL) grants the authorities powers to detain, arrest, and imprison persons who commit acts the government views as intended to endanger the "security of the state." Nongovernmental organizations (NGOs) continued to call for reform or abolishment of the law, contending that its provisions did not define prohibited activity clearly. The MOJ maintained that the courts had established legal precedents for strict interpretation of the law that preclude arbitrary application. The number of NSL investigations and arrests has dropped significantly in recent years.

During 2010 32 persons were detained for violating the National Security Law; 26 were indicted, one had indictment delayed, one was dismissed, and four others were under investigation. Of those who were indicted, 14 were convicted and 12 were in trial proceedings.

In August 2010 authorities arrested a pastor for violating the National Security Law by travelling to the Democratic People's Republic of Korea (DPRK or North Korea) without prior permission from the government. In December the pastor was sentenced to 10 years in prison.

The secondary school teacher indicted in August 2008 for violating the NSL by distributing banned material remained free on bail while awaiting trial. During the year the MOJ reported dropping the portion of the case related to the 1980 Kwangju uprising.

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[47] "2010 Human Rights Report: Republic of Korea," US Department of State (11 April 2011) http://www.state.gov.

Four members of an NGO detained and charged in September 2008 with illegal contact with Democratic People's Republic of Korea (DPRK or North Korea) agents and distribution of North Korean press material for the purpose of exalting DPRK leader Kim Jong-il were convicted during the year. Two of the members were serving prison sentences, and two members were given suspended sentences and probation. The NGO members appealed the sentences and filed a defamation claim against the government.

A university professor found guilty of violating the NSL in 2007 and sentenced to two years in jail had his sentence reduced to three years of probation. He appealed the conviction; the case was pending before the Supreme Court.

Arrest Procedures and Treatment While in Detention

…The law requires warrants in cases of arrest, detention, seizure, or search, except if a person is apprehended while committing a criminal act or if a judge is not available and the authorities believe that a suspect may destroy evidence or escape capture if not arrested quickly. In such cases a public prosecutor or police officer must prepare an affidavit of emergency arrest immediately upon apprehension of the suspect. Police may not interrogate for more than six hours persons who voluntarily submit to questioning at police stations. Authorities must release an arrested suspect within 20 days unless an indictment is issued. An additional 10 days of detention is allowed in exceptional circumstances.

There is a bail system, but human rights lawyers stated that bail generally was not granted for detainees who were charged with committing serious offenses, might attempt to flee or harm a victim, or had no fixed address.

The law provides for the right to representation by an attorney, including during police interrogation. There are no restrictions on access to a lawyer, but authorities can limit a lawyer's participation in an interrogation if the lawyer obstructs the interrogation or divulges information that impedes an investigation. The courts generally observed a defendant's right to a lawyer. During both detention and arrest periods, an indigent detainee may request that the government provide a lawyer.

Access to family members during detention varied according to the severity of the crime being investigated. There were no reports of access to legal counsel being denied.

Political Prisoners and Detainees

The MOJ stated that no persons were incarcerated solely because of their political beliefs. The NGO Mingahyup claimed that as of August 2009, the government had imprisoned 129 persons for their political beliefs.

In April 2009 a riot police conscript was sentenced to two years in prison for refusing to return to duty. He had ignored orders from his superiors to use violence against protesters during the 2008 beef protests.

The country requires military service for all men, although mandatory service periods vary: 24 months for the army, 26 months for the navy, and 27 months for the air force. The law does not protect conscientious objectors, who can receive a maximum three-year prison sentence. The MOJ has noted that the law does not distinguish conscientious objectors from others who do not report for mandatory military service. The MOJ reported that in 2010 there were 6,863 cases of Military Service Act violations, with 1,358 cases referred for trial and 5,505 cases settled out of court..

…During 2009 the Ministry of National Defense (MND) announced that it would not pursue the introduction of alternative service for conscientious objectors. The ministry cited a lack of public support as the primary reason for its decision; an MND-sponsored poll found that 68 percent of the respondents opposed instituting alternative service, but an independent poll taken about the same time found that only 39 percent were opposed. Meanwhile, the Jehovah's Witnesses reported that courts increasingly were sympathetic to conscientious objectors. In September 2008 a district court asked the Constitutional Court to review again the constitutionality of the Conscription Law. The request remained pending approval. The court ruled in 2002 and 2004 that the law is constitutional.

Freedom of Movement, Internally Displaced Persons, Protection of Refugees, and Stateless Persons

…Most citizens could move freely throughout the country; however, government officials restricted the movement of certain DPRK defectors by denying them passports. In many cases travelers going to the DPRK must receive a briefing from the Ministry of Unification prior to departure. They must also demonstrate that their trip does not have a political purpose and is not undertaken to praise the DPRK or criticize the ROK government. The government cooperated with the Office of the UN High Commissioner for Refugees and other humanitarian organizations in

assisting internally displaced persons, refugees, returning refugees, asylum seekers, stateless persons, and other persons of concern.

In September 2009 NGO leaders reported that Dolksun Isa, secretary general of the World Uighur Congress, was detained at Incheon airport for 42 hours, allegedly at China's request. Although he was later released and safely returned home, the government prohibited Isa from entering the country and attending an NGO conference in Seoul, as he had initially planned. MOJ officials emphasized that Isa was denied entry under the immigration law, not for political reasons.

The law does not include provisions for forced exile of its citizens, and the government did not employ it.

Official Corruption and Government Transparency

….The law provides criminal penalties for official corruption, and the government generally implemented these laws effectively. The Korea Independent Commission Against Corruption stated that the overall "cleanliness level" of the government for 2008 was 8.17 out of 10 points, a slight decrease from 8.89 in 2007. There were reports of officials receiving bribes and violating election laws. According to the MOJ, 4,067 government officials were prosecuted for abuse of authority, bribery, embezzlement or misappropriation, and falsification of official documents. The National Assembly reported that out of the 250 lawmakers facing indictment, 15 lawmakers were prosecuted for corruption and 12 were awaiting trial.

By law public servants above a certain rank must register their assets, including how they were accumulated, thereby making their holdings public. Among the anticorruption agencies are the Board of Audit and Inspection and the Public Servants Ethics Committee. In February 2008 the Korea Independent Commission Against Corruption, Ombudsman of Korea, and Administrative Appeals Commission were integrated to form the Anti-Corruption and Civil Rights Commission.

The country has a Freedom of Information Act; in practice the government granted access for citizens and noncitizens alike, including foreign media.

The Republic of Korea (Korea or ROK) is a constitutional democracy governed by President Lee Myung-bak and a unicameral legislature. The country has a population of approximately 48 million. In April 2008 the Grand National Party obtained a majority of National Assembly seats in a free and fair election. Civilian authorities maintained effective control of the security forces.

…There were no reports that the government or its agents committed arbitrary or unlawful killings. Official figures indicated that hazing was a factor in many of the 356 suicides by military personnel since 2004.

…There were no reports of politically motivated disappearances.

Section 5: Counterterrorism, Terrorism and Low-Level Asymmetric Warfare

From a military point of view, there is no clear line between terrorism and asymmetric warfare. It is also a historical fact that the side with the stronger regular military forces is either less likely to use such tactics, or conceal them in the form of state terrorism.

The DPRK has repeatedly challenged the ROK using low level covert operations and asymmetric attacks and used them to put pressure on both the ROK and the United States. The DPRK has also deployed large amounts of its force structure for the same purpose, keeping the ROK under constant pressure. It has created a special balance in the border area by creating tunnel systems and deploying large amounts of artillery in caves and sheltered positions within range of ROK's capital, Seoul.

The US and ROK feel that the historical record shows that there was nothing new about the DPRK's use of limited or asymmetric attacks—some of which the US and ROK label as terrorism—in 2010. The DPRK's willingness—and inventiveness—in using the threat and reality of such attacks was so consistent between 1950 and 2007, that it led the Congressional Research Service to prepare a 36 page chronology which covered 164 examples of armed invasion; border violations; infiltration of armed saboteurs and spies; hijacking; kidnapping; terrorism (including assassination and bombing); threats/intimidation against political leaders, media personnel, and institutions; incitement aimed at the overthrow of the ROK government; actions undertaken to impede progress in major negotiations; and tests of ballistic missiles and nuclear weapons. [48]

The CRS report summarizes these trends as follows,

> The most intense phase of the provocations was in the latter half of the 1960s, when North Korea (Democratic People's Republic of Korea, or DPRK) staged a series of limited armed actions against South Korean and US security interests. Infiltration of armed agents into South Korea was the most frequently mentioned type of provocation, followed by kidnapping and terrorism (actual and threatened). From 1954 to 1992, North Korea is reported to have infiltrated a total of 3,693 armed agents into South Korea, with 1967 and 1968 accounting for 20% of the total. Instances of terrorism were far fewer in number, but they seemed to have had a continuing negative impact on relations between the two Koreas. Not counting the DPRK's invasion of South Korea that triggered the Korean War (1950-1953), the DPRK's major terrorist involvement includes attempted assassinations of President Park Chung Hee in 1968 and 1974; a 1983 attempt on President Chun Doo Hwan's life in a bombing incident in Rangoon, Burma (Myanmar); and a mid-air sabotage bombing of a South Korean Boeing 707 passenger plane in 1987. Reported provocations have continued intermittently in recent years, in the form of armed incursions, kidnappings, and occasional threats to turn the South Korean capital of Seoul into "a sea of fire" and to silence or tame South Korean critics of North Korea. Then, in July 2006, North Korea launched seven missiles into the Sea of Japan, and in October 2006, it tested a nuclear bomb.

The US State Department annual assessment of the DPRK and ROK's role in terrorism and counter terrorism provides a current assessment of each countries role in such activities, and of

[48]Hannah Fischer, *North Korean Provocative Actions, 1950 – 2007*, Congressional Research Service, RL30004, April 20, 2007.

how they might affect the military balance, although these assessments again reflect a Western perspective:

- **Figure 5.1 provides the reporting on the DPRK.**
- **Figure 5.2 provides the reporting on the ROK.**

Once again, it was not possible to find comparable assessments from a DPRK viewpoint. It is important to note, however, that Pyongyang may see the use of unconventional or asymmetric warfare as the only way it can exert safely exert military pressure on the ROK and the US, and force the pace of negotiation. In realpolitik, the difference between terrorism and asymmetric warfare is often a matter of perspective and semantics.

Figure 5.1 Counterterrorism and Terrorism in the DPRK[49]

The Democratic People's Republic of Korea (DPRK) was not known to have sponsored any terrorist acts since the bombing of a Korean Airlines flight in 1987. On October 11, 2008, the United States removed the designation of the DPRK as a state sponsor of terrorism in accordance with criteria set forth in US law, including a certification that the government of the DPRK had not provided any support for international terrorism during the preceding six-month period and the provision by the DPRK of assurances that it will not support acts of international terrorism in the future.

In May, the United States re-certified the DPRK as "not cooperating fully" with US counterterrorism efforts under Section 40A of the Arms Export and Control Act, as amended. Pursuant to this certification, defense articles and services may not be sold or licensed for export to North Korea from October 1, 2009 to September 30, 2010. This certification will lapse unless it is renewed by the Secretary of State by May 15, 2010.

Four Japanese Red Army (JRA) members who participated in a jet hijacking in 1970 continued to live in the DPRK. On June 13, 2008, the government of Japan announced that the DPRK had agreed to cooperate in handing over the remaining members of the JRA involved in the hijacking. However, the DPRK has not yet fulfilled this commitment.

The Japanese government continued to seek a full accounting of the fate of 13 Japanese nationals believed to have been abducted by DPRK state entities in the 1970s and 1980s. The DPRK admitted to abducting eight of these individuals, but claimed that they have since died; the DPRK has denied having abducted the other four individuals. On August 12, 2008, Japan and the DPRK agreed on steps towards the eventual resolution to this issue. However, the DPRK has not yet fulfilled its commitment to reopen its investigations into the abductions. Since 2002, five other abductees have been repatriated to Japan.

[49] See Office of the Coordinator, US State Department***, Country Reports on Terrorism***, Chapter 2. Country Reports: East Asia and Pacific Overview, August 5, 2010, http://www.state.gov/s/ct/rls/crt/2009/140884.htm.

Figure 5.2 Counterterrorism and Terrorism in the Republic of Korea (ROK) [50]

The Republic of Korea (South Korea) demonstrated excellent law enforcement and intelligence capabilities to combat terrorism. South Korean immigration and law enforcement agencies had a strong record of tracking suspicious individuals entering their territory and reacting quickly to thwart potential terrorist acts. Seoul also reviewed and strengthened its emergency response plan and, in accordance with UNSCR 1267 and 1373, further tightened its legislative framework and administrative procedures to combat terrorist financing. For example, the Prohibition of Financing for Offenses of Public Intimidation Act took effect in December 2008 and was intended to implement the UN Convention for the Suppression of the Financing of Terrorism, to which the South Korea has been a party since 2004. Under the Act, funds for public intimidation offenses are identified as "any funds or assets collected, provided, delivered, or kept for use in any of the following acts committed with the intention to intimidate the public or to interfere with the exercise of rights of a national, local, or foreign government." An amendment expanding the government's ability to confiscate funds related to terrorism was enacted in March, enabling the government to confiscate not only the direct proceeds of terrorism, but also funds and assets derived from those proceeds. In October, South Korea became a full member of FATF. The accession to FATF will allow Korea, an observer since 2006, to actively participate in the process of setting and revising global Anti-Money Laundering and Counterterrorismm Financing Terrorism (AML/CTF) standards and increase international cooperation.

South Korea supported US counterterrorism goals in Afghanistan by announcing the establishment of a Provincial Reconstruction Team. In addition, South Korea worked closely with other foreign partners and played a constructive role in improving regional counterterrorism capabilities. South Korea continued to participate in the counterterrorism activities of the Asia-Pacific Economic Cooperation forum, the ASEAN Regional Forum, and the Asia-Europe Meeting. The Korea Overseas International Cooperation Agency hosted counterterrorism training and capacity-building programs for regional partners in forensic science, prevention of money laundering, and cyber security.

In March, the Counterterrorism Committee Executive Directorate of the United Nations visited South Korea to monitor its efforts to combat terrorism in accordance with UNSCR 1373. The team found that Korea had made good progress with respect to AML/CFT laws and mechanisms to criminalize terrorist financing and freeze funds and assets. In October, the Korea Institute for Defense Analyses hosted the ninth Biannual Symposium of the Council for Asian Terrorism Research, with the theme "Korean Peninsula WMD Threats: Regional and Global Implications." In November, South Korea hosted the second APEC Cybersecurity Seminar on "Protection of Cyberspace from Terrorist Attacks and Use," which brought 13 countries together to discuss recent cyber attacks and ways to deal with the challenges of cyber terrorism. In December, the Ambassador for International Counterterrorism Cooperation hosted the second round of South Korea-US bilateral counterterrorism consultations, attended on the US side by the Deputy Coordinator for Regional Affairs of the Office of the Coordinator for Counterterrorism. Korea also held bilateral counterterrorism meetings with Indonesia, Japan, France, and Germany during the year.

The South Korean government has recently been concerned over the growing number of South Korean citizens abroad who have been victims of terrorist attacks. In March, four South Korean tourists were killed and five were wounded in a suicide bombing in Yemen, for which al-Qa'ida later claimed responsibility. In June, another South Korean civilian working for a medical NGO in Yemen was kidnapped and killed. Although the Yemeni government did not find a conclusive connection to an established terrorist group in that incident, the South Korean government was put on alert and is now exploring various possibilities to prevent future attacks on its citizens.

[50] See Office of the Coordinator, US State Department**, *Country Reports on Terrorism***, Chapter 2. Country Reports: East Asia and Pacific Overview, August 5, 2010, http://www.state.gov/s/ct/rls/crt/2009/140884.htm.

Section 6: Korean Missile and WMD Forces

South Korea has examined both nuclear and missile options. It has the capability to create nuclear weapons, and a sound base of nuclear technology to build upon. It also can almost certainly design and build cruise and ballistic missiles that can reach any target in North Korea in a relatively short period time. It also has all of the technology and industrial based to design and build advanced chemical and biological weapons. This gives it a near break out capability to compete with North Korea if it chooses to do so. So far, however, it has chosen to rely on the US for extended deterrence, and focused more on deploying advanced air defense systems and missile defenses than offensive systems.

North Korea, in contrast, is a long-standing chemical weapons power, and has tested two nuclear devices – albeit with mixed success. It is actively developing long-range missiles and almost certainly has both researched biological weapons and the capacity to build them. So far, it has not seriously modernized its air defenses or shown that it plans to buy and deploy missile defenses.

The two Koreas differ sharply in their political and military need for weapons of mass destruction and missiles. South Korea is now a global economic power fully integrated into the international system. North Korea is close to a failed stated in terms of its economy, and needs nuclear weapons and missile for both political prestige and leverage in negotiating with the US and its neighbors.

In military terms, North Korea's economic limitations have made it impossible for it compete with its neighbors in modernizing its conventional forces, and this gives Pyongyang a strong incentive to retain and expand its asymmetric capabilities. This mix of political and military factors has made the DPRK's nuclear programs—and efforts to acquire nuclear weapons and long-range, ballistic missiles—a source of concern and arms control efforts for the better part of two decades. Despite these efforts, the DPRK became the world's eighth atomic power when it conducted an underground nuclear weapons test in October 2006, and continues both in its nuclear weapons and long-range missile programs.

It should be stressed, however, that DRPK's nuclear programs are only part of this aspect of the military balance. Weapons of mass destruction include chemical, biological, radiological, and nuclear (CBRN) weapons. The DPRK reportedly possesses a sizable stockpile of chemical and, possibly, biological weapons as well as the ability to mount them on conventional and unconventional delivery systems. It is also important to note that the balance also includes the CBRN weapons of outside actors like the United State and China, which may be a reason why the ROK has chosen (or been coerced) to maintain little if any CBRN stockpiles relative to the DPRK.

DPRK Nuclear Developments

Pyongyang has effectively ended its past agreements to limit the production of nuclear materials and its missile tests, posing very real concerns not only in the region, but in the international community. According to a May 2010 UN Security Council report on the DPRK's nuclear

program, "the Democratic People's Republic of Korea believes […] that its nuclear programme [sic] can provide the country a way to achieve its stated goal of becoming a 'strong and prosperous country' (*kangsongdaeguk*) by the year 2012 without succumbing to what they view as 'foreign influences.'"[51]

The DPRK considers its nuclear programs to be a negotiating valuable asset that provides them important leverage in dealing with the rest of the world, especially given the increased tensions on the Korean Peninsula of late. In June 2010, a DPRK Foreign Ministry spokesman stated that "recent developments" have underscored the need for the DPRK "to bolster its nuclear deterrent in a newly developed way."[52] Given the aggressiveness in the DPRK sinking of the ROK Corvette *Cheonan* in March 2010 and in the shelling of Yonphyong Island in November, there may be little possibility that the DPRK will give up its nuclear weapons program any time soon. Moreover, it is clear than North Korea sees Qaddafi's willingness to give up its nuclear programs as one reason that the UN and NATO were willing to impose a no fly zone and make a de facto effort to remove him from power. It also sees India, Iran, Israel, and Pakistan as examples of small states whose nuclear efforts also give them political and military leverage.

It is difficult to determine just how large the DPRK's nuclear program is and how much progress it is making. The DPRK is an extremely isolated and secretive state and provides few signals of the existence—let alone the extent—of its nuclear weapons program, which has resulted in substantial uncertainty about the size and capability of the DPRK's nuclear program. However, a general picture of the program has become clear over the past two decades.

The US Intelligence Community assesses Pyongyang views its nuclear capabilities as intended for "deterrence, international prestige, and coercive diplomacy," and, thus, would consider using nuclear weapons only "under certain narrow circumstances."[53] In addition, research centers like ISIS have indicated that the DPRK may be sharing at least some aspects of its nuclear weapons technology with the Islamic Republic of Iran and the Syrian Arab Republic.[54] Mike Green of the Center for Strategic and International Studies (CSIS) also notes, "the danger of horizontal escalation by the DPRK—namely, transferring weapons to third parties in the event of tensions or conflict. The DPRK directly threatened the United States with this in March 2003."[55]

While unclassified estimates must depend to some extent on sophisticated guesswork, the DPRK has probably obtained enough plutonium from its power reactors to have 4-13 nuclear weapons—even allowing for the material used in its two tests. According to a February 2009 report by the Congressional Research Service (CRS), North Korea has up to 50 kilograms of

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[51] United Nations Security Council, "Report of the Panel of Experts established pursuant to resolution 1874 (2009)," S/2010/571 (5 Nov 2010), http://www.securitycouncilreport.org.

[52] Simon Martin, "N.Korea vows to bolster nuclear deterrent," *Agence France Presse* (June 27, 2010); see also KCNA (28 Jun 2010).

[53] James Clapper, "Annual Threat Assessment of the US Intelligence Community," US House Permanent Select Committee on Intelligence (10 Feb 2011), http://www.dni.gov.

[54] See http://isis-online.org/isis-reports/imagery/category/korean-peninsula/ and other material in the Korea section (http://isis-online.org/countries/category/korean-peninsula) of the ISIS web page. Additional material can be found in the Global Security, Federation of American Scientists, and Nuclear Threat Initiative web pages.

[55] Email from Mike Green, 7 Feb 2011 3:57 PM

separated plutonium, enough for at least half a dozen nuclear weapons.[56] The Nuclear Threat Initiative (NTI) estimates the DPRK to have 6-10kg of weapons grade plutonium and another 29-34kg of plutonium in spent fuel stockpiles that could be reprocessed and weaponized.[57] ROK Ministry of National Defense figures are similar, estimating that the DPRK has secured about 40 kg of plutonium as a result of three reprocessing procedures (as of 2008).[58] Additionally, the Strategic Studies Institute (SSI) believes that the DPRK has discharged anywhere from 43 to 61 kg from its 5MWe reactor since 1989 (**see Figure 6.1**).

Figure 6.1 Estimates of DPRK Plutonium Production (as of 2006)

Plutonium Discharged from 5 M We Reactor		**Plutonium Separation**		**Weapon Equivalents***
Date	Amount (kg)	Date	Amount (kg)	(number)
Before 1990	1-10**	1989-1992	1-10	0-2
1994	27-29	2003-2004	20-28	4-7
Spring 2005	0-15	2005-2006	0-15	0-3
In core of 5 M We Reactor	5-7	--	--	--
Total	43-61		20-53	4-13***

*It is assumed that each nuclear weapon would require 4-5Kg of separated plutonium
**This quantity includes up to 1-2 kilograms of plutonium produced in the IRT reactor prior to 1994 (see "Early Program")
***The upper bound of the number of weapons is higher than the sum of the individual upper bounds, because particular periods list more plutonium than needed to give the upper bound for that period.
Source: Kwang Ho Chun, *North Korea's Nuclear Question: Sense of Vulnerability, Defensive Motivation, and Peaceful Solution*, US Army Strategic Studies Institute (28 Dec 2010), 24.

The DPRK has halted its plutonium production from its 5MWe reactor in Yongbyon, but plutonium production and weaponization could easily be restarted. According to a December 2010 CRS report:

> In order to produce additional plutonium, the North Koreans would need to restore their 5-MWe reactor or build a new reactor. Timelines for restoring the 5-MWe reactor are uncertain, although experts estimate between six months and one year. Rebuilding the cooling tower, which was destroyed in June 2008, could take approximately six months, but other venting solutions for the reactor could be possible. Additionally, this aging reactor may be in need of additional parts or repair…After the facilities were operating, they could produce approximately 6 kg of plutonium per year.[59]

While North Korea's weapons program was plutonium-based at the start, intelligence has emerged in the last decade showing it is pursuing a second route using highly enriched uranium (HEU). The DPRK confirmed this on 13 June 2009 when it announced it would commence uranium enrichment, stating "enough success has been made in developing uranium enrichment technology to provide nuclear fuel to allow the experimental procedure."[60] Three months later, DPRK officials announced that experimental uranium enrichment had entered into the "completion phase."[61] According to the US Intelligence Community, the exact intent of these

[56] Mary Beth Nikitin, *North Korea's Nuclear Weapons*, Congressional Research Service (12 February 2009).
[57] "North Korea Profile – Capabilities," NTI, http://www.nti.org.
[58] *Defense White Paper 2008*, Republic of Korea Ministry of Defense, 37.
[59] Mary Beth Nikitin, *North Korea's Nuclear Weapons: Technical Issues*, Congressional Research Service (20 Jan 2011), 20.
[60] "DPRK Foreign Ministry Declares Strong Counter-Measures against UNSC' Resolution," KCNA (13 June 2009).
[61] "DPRK Permanent Representative Sends Letter to President of UNSC," KCN (4 Sep 2009).

announcements is unclear, and they do not speak definitively to the technical status of the uranium enrichment program.[62]

In November 2010, a visit by Dr. Siegfriend Hecker to Yongbyon shed additional light on the DPRK HEU program. On his visit he saw "a small, recently completed, industrial-scale uranium-enrichment facility" that *appeared* fully operational (Dr. Hecker and his colleagues were unable to confirm whether it was in fact operating at full capacity).[63] These reports were followed by press reports that the International Atomic Energy Agency (IAEA) suspected that the DPRK had at least one additional covert centrifuge site, and might have significant additional sites.[64] These reports mean that the DPRK may have significant stocks of enriched uranium, as well as plutonium.

At a minimum, this means the DPRK's future production of weapons grade material is impossible to predict, and that both targeting and arms control are far more difficult because of the inability to predict how many dispersed centrifuge facilities the DPRK may have. However, the DPRK is probably far from having a self-sufficient program. According to ISIS:

> Whatever North Korea has accomplished in building centrifuges, it faces an ongoing, fundamental problem. It is not self-sufficient in making and operating centrifuges. It acquired key equipment and materials abroad and appears to be continuing its overseas procurements. North Korea will undoubtedly need additional equipment and materials to build and operate large numbers of centrifuges successfully.[65]

Weaponization

Despite the progress in their nuclear program, it is unclear whether the DPRK has mastered the ability to efficiently weaponize a nuclear device. The detonation of a nuclear explosive device is a significant scientific achievement, but creating a device that can be included in a small bomb or a missile warhead presents a number of difficult engineering problems.[66] Theoretically, the DPRK could use an aircraft, a ship, or even a vehicle to deliver a nuclear weapon, but these platforms are either vulnerable or unreliable.

It is difficult to eliminate the possibility that North Korea has achieved weaponization. ROK intelligence believes DPRK engineers were able to make significant progress in warhead miniaturization between 1999 and 2001, and the national defense ministry now believes the DPRK has warheads that can be mounted on ballistic missiles.[67] Furthermore, ROK Intelligence sources told the International Crisis Group in 2009 they believe the DPRK has deployed nuclear

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[62] Dennis Blair, "Annual Threat Assessment of the US Intelligence Community," US Senate Select Committee on Intelligence (2 Feb 2010), http://www.dni.gov.
[63] Siegfried Hecker, "What I Found in North Korea," *Foreign Affairs* (9 Dec 2010) http://www.foreignaffairs.com.
[64] Chico Harlan, "UN Report Suggests N. Korea Has Secret Nuclear Sites," *Washington Post* (1 Feb 2011), A7.
[65] David Albright and Paul Brannan, *Taking Stock: North Korea's Uranium Enrichment Program*, The Institute for Science and International Security (8 Oct 2010) 24-5.
[66] *North Korea's Nuclear and Missile Programs- Asia Report No. 168*, International Crisis Group (18 June 2009), 9.
[67] *North Korea's Nuclear and Missile Programs- Asia Report No. 168*, International Crisis Group (18 June 2009), 10.

warheads for *Nodong* missiles in the northern part of the country (see section on DPRK missile systems for more information).[68]

The Early Program

North Korea's strengths and weaknesses in weaponizing and deploying nuclear weapons become clearer if one examines the history of its efforts. The origins of the DPRK nuclear program seem to stem from the gross insecurity felt by then leader of the DPRK, Kim-Il-sung, following the near defeat of his forces in the Korea War. Although nuclear weapons were never used, US political leaders and military commanders threatened their use during the war. In February 1956, Pyongyang signed the founding charter of the Soviet Union's Joint Institute for Nuclear Research and began to send scientists and technicians to the USSR for training shortly thereafter.[69] When the United States deployed nuclear weapons to South Korea for the first time in 1958, the DPRK began a rudimentary nuclear program primarily focused on basic training and research, relying on assistance from the Soviet Union, which trained North Korean scientists and engineers and helped to construct basic research facilities—including a small research reactor (the IRT-2000) in Yongbyon.[70]

In the late 1960s, the DPRK expanded its educational and research institutions to support a nuclear program for both civilian and military applications. By the early 1970s, DPRK engineers began using indigenous technology to expand its IRT-2000 reactor, and Pyongyang began acquiring plutonium reprocessing technology from the Soviet Union.[71] In July 1977, the DPRK signed a trilateral safeguards agreement with the IAEA and the USSR that brought the IRT-2000 research reactor and a critical assembly plant in Yongbyon under IAEA safeguards.[72]

In 1980, Pyongyang's nuclear program began a period of expansion to the point that it could produce substantial amounts of nuclear energy and weapons-grade plutonium.[73] This expansion included uranium milling facilities, a fuel rod fabrication complex, and a 5MW(e) nuclear reactor, as well as research and development institutions.[74] By the mid-1980s, Pyongyang began construction on a 50MW(e) nuclear power reactor in Yongbyon, and expanded its uranium processing facilities.[75] Pyongyang was also exploring the acquisition of light water power reactors (LWRs), and agreed to sign the Non-Proliferation Treaty (NPT) in December 1985 in exchange for Soviet assistance in the construction of four LWRs.[76] However, the DPRK refused to sign a safeguards agreement with the International Atomic Energy Agency (IAEA), an obligation it had as a party to the Nuclear Non-Proliferation Treaty.[77]

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[68] 7 Jan 2009 Interview, *North Korea's Nuclear and Missile Programs- Asia Report No. 168*, International Crisis Group (18 June 2009), 11.
[69] "North Korea Nuclear Profile," Nuclear Threat Initiative, http://www.nti.org.
[70] John Chipman, *North Korea's Weapons Programmes: A Net Assessment*, IISS (21 Jan 2004), 27.
[71] "North Korea Nuclear Profile," Nuclear Threat Initiative, http://www.nti.org.
[72] "North Korea Nuclear Profile," Nuclear Threat Initiative, http://www.nti.org.
[73] John Chipman, *North Korea's Weapons Programmes: A Net Assessment*, IISS (21 Jan 2004), 27.
[74] "North Korea Nuclear Profile," Nuclear Threat Initiative, http://www.nti.org.
[75] "North Korea Nuclear Profile," Nuclear Threat Initiative, http://www.nti.org.
[76] "North Korea Nuclear Profile," Nuclear Threat Initiative, http://www.nti.org.
[77] "North Korea, Nuclear Weapons Program," The Federation of American Scientists, http://www.fas.org.

Denuclearization of the Korean Peninsula and the 1993-94 Crisis

In September 1991, President George HW Bush announced that the United States would withdraw its nuclear weapons from South Korea, and on 18 December 1991, South Korean President Roh Tae Woo declared that South Korea was free of nuclear weapons.[78] As a result, the DPRK and ROK signed the "Joint Declaration on the Denuclearization of the Korean Peninsula." In the declaration, both sides promised to "not test, manufacture, produce, receive, possess, store, deploy or use nuclear weapons" and to forgo the possession of "nuclear reprocessing and uranium enrichment facilities."[79]

Following the signing of the Joint Declaration, the DPRK signed an IAEA safeguards agreement on 30 January 1992. Under the terms of the agreement, North Korea provided an "initial declaration" of its nuclear facilities and materials and allowed IAEA inspectors to verify the completeness and correctness of the initial declaration.[80] Inspections began in May 1992 and concluded in February 1993; however, when the IAEA requested access to two suspect nuclear waste sites, North Korea declared them to be military sites and therefore off-limits.[81] In response, the UN Security Council on 11 May 1993 passed Resolution 825 urging the DPRK to cooperate with the IAEA and to implement the 1991 North-South denuclearization accord.[82]

At a deadlock with the IAEA and facing sanctions from the UN, North Korea announced its intention to withdraw from the NPT on 12 March 1993. The US responded by holding political-level talks with the DPRK in early June 1993 that led to a joint statement outlining the basic principles for continued US-DPRK dialogue and North Korea's "suspending" its withdrawal from the NPT before it became legally effective.[83] However, the agreement was short-lived. Immediately following the return of IAEA inspectors to North Korea in March 1994, the DPRK refused to allow the inspection teams to inspect a plutonium reprocessing plant at Yongbyon, and in May 1993 the IAEA confirmed that North Korea had begun removing spent fuel from its 5MW(e) nuclear research reactor even though international monitors were not present (spent fuel can be reprocessed for use in nuclear weapons).[84] Faced again with renewed UN sanctions, the DPRK withdrew from the IAEA on 13 June 1994. Although still a member of the NPT, the DPRK no longer participated in IAEA functions as a member state, and thus refused to allow inspectors to carry out their work under the Safeguards Agreement.[85]

The crisis was defused by then former President Carter's visit in June 1994 to the DPRK. Four

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[78] "North Korea Nuclear Profile," Nuclear Threat Initiative, http://www.nti.org.
[79] "ROK-DPRK Joint Declaration of the Denuclearization of the Korean Peninsula, 20 January 1992," available at http://www.nti.org/db/china/engdocs/snkdenuc.htm
[80] "Agreement of 30 January 1992 between the Government of the Democratic People's Republic of Korea and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons," International Atomic Energy Agency, INFCIRC/403, http://www.iaea.org.
[81] "North Korea Nuclear Profile," Nuclear Threat Initiative, http://www.nti.org.
[82] United Nations Security Council, S/RES/825 (11 May 1993), http://www.securitycouncilreport.org.
[83] "Chronology of US-North Korean Nuclear and Missile Diplomacy," Arms Control Association, http://www.armscontrol.org.
[84] "Chronology of US-North Korean Nuclear and Missile Diplomacy," Arms Control Association, http://www.armscontrol.org.
[85] "Chronology of US-North Korean Nuclear and Missile Diplomacy," Arms Control Association, http://www.armscontrol.org.

months of negotiations concluded in an Agreed Framework between the US and the DPRK on 21 October 1994. Under the agreement the US committed itself to make arrangements for the provision of a LWR generating capacity of approximately 2000 MW(e) in exchange for a DPRK "freeze" and ultimately the dismantlement of its graphite-moderated reactors and related facilities.[86] Although the accord froze North Korea's plutonium production facilities and placed them under IAEA monitoring, the US estimated that Pyongyang could have recovered enough plutonium for one or two nuclear weapons before the agreement came into force.[87]

The Collapse of the Agreed Framework (1994-2003)

Following the agreement, he DPRK's indigenous plutonium production facilities remained frozen, and its known plutonium stocks were subject to IAEA monitoring. The facilities subject to the freeze were the 5MW(e) reactor, the Radiochemical Laboratory (reprocessing), the fuel fabrication plant, and the partially built 50 and 200MW(e) nuclear power plants.[88] It was during this time that the international community discovered the extent of the DPRK's plutonium production in the late eighties and early nineties. According to the American Federation of Scientists:[89]

> A close examination by the IAEA of the radioactive isotope content in the nuclear waste revealed that North Korea had extracted about 24 kilograms of Plutonium. North Korea was supposed to have produced 0.9 gram of Plutonium per megawatt every day over a 4-year period from 1987 to 1991. The 0.9 gram per day multiplied by 365 days by 4 years and by 30 megawatts equals to 39 kilograms. When the yearly operation ratio is presumed to be 60 percent, the actual amount was estimated at 60% of 39 kilograms, or some 23.4 kilograms. Since 20-kiloton standard nuclear warhead has 8 kilograms of critical mass, this amounts to mass of material of nuclear fission out of which about 3 nuclear warheads could be extracted.
>
> Estimates vary of both the amount of plutonium in North Korea's possession and number of nuclear weapons that could be manufactured from the material. South Korean, Japanese, and Russian intelligence estimates of the amount of plutonium separated, for example, are reported to be higher—7 to 22 kilograms, 16 to 24 kilograms, and 20 kilograms, respectively—than the reported US estimate of about 12 kilograms. At least two of the estimates are said to be based on the assumption that North Korea removed fuel rods from the 5-MW(e) reactor and subsequently reprocessed the fuel during slowdowns in the reactor's operations in 1990 and 1991. The variations in the estimates about the number of weapons that could be produced from the material depend on a variety of factors, including assumptions about North Korea's reprocessing capabilities—advanced technology yields more material—and the amount of plutonium it takes to make a nuclear weapon. Until January 1994, the Department of Energy (DOE) estimated that 8 kilograms would be needed to make a small nuclear weapon. Thus, the United States' estimate of 12 kilograms could result in one to two bombs. In January 1994, however, DOE reduced the estimate of the amount of plutonium needed to 4 kilograms--enough to make up to three bombs if the US estimate is used and up to six bombs if the other estimates are used.[90]

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[86] "Agreed Framework Between the United States of America and the Democratic People's Republic of Korea," Geneva (21 October 1994), http://www.kedo.org.
[87] John Chipman, *North Korea's Weapons Programmes: A Net Assessment*, IISS (21 Jan 2004), 27.
[88] "Fact Sheet on DPRK Nuclear Safeguards," International Atomic Energy Agency, http://www.iaea.org.
[89] "North Korea Nuclear Profile," Nuclear Threat Initiative, http://www.nti.org.
[90] "North Korea, Nuclear Weapons Program," The Federation of American Scientists, http://www.fas.org/nuke.

Despite the freeze, neither party was completely satisfied with either the compromise reached or its implementation. The United States was dissatisfied with the postponement of safeguards inspections to verify Pyongyang's past activities, and North Korea was dissatisfied with the delayed construction of the light water power reactors.

Uranium Enrichment and Renewed Crisis

With the plutonium route partly blocked by the Agreed Framework, Pyongyang seems to have instigated a secret program in the late 1990s to develop the means to produce weapons-grade enriched uranium utilizing gas centrifuge technology.[91] These efforts were brought to light in October 2002 with the announcement by the US that the DPRK had acknowledged, in talks with Assistant Secretary of State for East Asian and Pacific Affairs James Kelly, a "program to enrich uranium for nuclear weapons."[92]

This led to the conclusion that the DPRK's program was a violation of the Agreed Framework, the Non-Proliferation Treaty, the DPRK-IAEA Safeguards Agreement and the North-South Joint Declaration on the Denuclearization of the Korean Peninsula.[93] In November 2002 the IAEA adopted a resolution calling upon North Korea to "clarify" its "reported uranium-enrichment program."[94] North Korea rejected the resolution, saying the IAEA's position was biased and in favor of the United States.[95] The United States responded in December 2002 by suspending heavy oil shipments, and North Korea subsequently retaliated by lifting the freeze on its nuclear facilities, expelling IAEA inspectors monitoring that freeze, and announcing its withdrawal from the NPT on 10 January 2003.[96] On 26 December 2002, an IAEA press release stated that North Korea had cut all IAEA seals, disrupted IAEA surveillance equipment on its nuclear facilities and materials, and started moving fresh fuel rods into the reactor.[97]

In terms of arms control, not much progress was made following the DPRK's withdrawal from the NPT. In early 2003, US intelligence detected activities around Yongbyon, which indicated that North Korea was probably reprocessing the 8,000 spent fuel rods that had been in a temporary storage pond.[98] The assessment was reaffirmed in September when a DPRK Foreign Ministry spokesman said that reprocessing of this spent fuel had been completed, giving enough plutonium for approximately four to six nuclear devices.[99] This was confirmed in January 2004

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[91] John Chipman, *North Korea's Weapons Programmes: A Net Assessment*, IISS (21 Jan 2004), 27.
[92] "Fact Sheet on DPRK Nuclear Safeguards," International Atomic Energy Agency, http://www.iaea.org.
[93] "Fact Sheet on DPRK Nuclear Safeguards," International Atomic Energy Agency, http://www.iaea.org.
[94] "IAEA Board of Governors Adopts Resolution on Safeguards in the DPRK," IAEA (29 Nov 2002), http://www.iaea.org.
[95] "Chronology of US-North Korean Nuclear and Missile Diplomacy," Arms Control Association, http://www.armscontrol.org.
[96] Carol Giacomo, "US Says N. Korean Fuel Oil Deliveries Should End," *Reuters* (13 November 2002), www.reuters.com; P.S. Suryanarayana, "IAEA Inspectors Leave N. Korea," *The Hindu* (1 January 2003); "Statement of DPRK Government on Its Withdrawal from NPT," KCNA (10 January 2003), www.kcna.co.jp.
[97] "IAEA Director General Cites DPRK 'Nuclear Brinkmanship,'" IAEA (26 December 2002), http://www.iaea.org.
[98] William Perry (speech), "Crisis on the Korean Peninsula: Implications for US Policy in Northeast Asia," Brookings Institute (24 January 2003).
[99] David E. Sanger, "North Korea Says It Has Made Fuel from Atom Bombs, *The New York Times* (15 July 2003).

when a delegation of invited US experts, headed by Dr. Siegfried Hecker, confirmed that the canisters in the temporary storage pond were empty.[100]

In April 2003, a multilateral dialogue involving six nations—the US, China, Russia, DPRK, ROK, and Japan—began with the aim of ending North Korea's nuclear weapons program; however, little was accomplished. After multiple meetings spanning two years, the parties could only agree to a Statement of Principles.[101] And even this, soon fell apart. During the time of the talks, the DPRK had continued its plutonium reprocessing, and when the six-party process stagnated April 2005, it shut down its 5MW(e) reactor in and removed the spent fuel.[102] The reactor had been operating since February 2003, meaning that it could have produced enough plutonium for between one and three nuclear devices in its spent fuel.[103]

The October 2006 Test and 2007 Accords

The situation continued to deteriorate throughout 2006, reaching a low point in October when North Korea conducted its first nuclear test. Following the underground test, the US Director of National Intelligence (DNI) issued a press release stating, "Analysis of air samples collected on October 11, 2006 detected radioactive debris which confirms that North Korea conducted an underground nuclear explosion in the vicinity of P'unggye on October 9, 2006. The explosion yield was less than a kiloton."[104] North Korea was reportedly expecting at least a 4 kiloton yield, possibly indicating that the North Korean plutonium program still had a number of technical hurdles to overcome before it had a usable warhead.[105]

After intense diplomatic activity by the Chinese government and others involved in the six-party process, the parties met again, and in February 2007 they agreed on the "Initial Actions for the Implementation of the Joint Statement." The DPRK agreed to abandon all its nuclear weapons and existing nuclear programs, and return to the NPT and IAEA safeguards, in exchange for a package of incentives that included the provision of energy assistance to the DPRK by the other parties.[106] After the February 2007 agreement, Pyongyang began shutting down and sealing it main nuclear facilities at Yongbyon-kun under IAEA supervision.[107]

Further progress was made in the Six-Party Talks when the parties adopted the second "action plan" that called on the DPRK to disable its main nuclear facilities and submit a complete and

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[100] Siegfried S. Hecker, "Visit to the Yongbyon Nuclear Scientific Research Center in North Korea," Senate Committee on Foreign Relations (21 January 2004).
[101] "North Korea Nuclear Profile," Nuclear Threat Initiative, http://www.nti.org.
[102] "N. Korea Moves to Bolster Nuclear Arsenal," *Korea Times* (18 April 2005).
[103] "North Korea Nuclear Profile," Nuclear Threat Initiative, http://www.nti.org.
[104] Office of the Director of National Intelligence, Public Affairs Office, "Statement by the Office of the Director of National Intelligence on the North Korea Nuclear Test," (16 October 2006).
[105] "North Korea Nuclear Profile," Nuclear Threat Initiative, http://www.nti.org.
[106] "Initial Actions for the Implementation of the Joint Statement," Foreign Ministry of the People's Republic of China (13 Feb 2007), http://www.fmprc.gov.cn/eng.
[107] "North Korea Nuclear Profile," Nuclear Threat Initiative, http://www.nti.org.

correct declaration of all its nuclear programs by 31 December 2007.[108] While disablement activities on the three key plutonium production facilities at Yongbyon progressed (see Figure 6.2), Pyongyang failed to meet the 31 December deadline to submit its declaration. Almost six months past the deadline, on 26 June 2008, North Korea submitted its declaration, which indicated that North Korea separated a total of about 30 kilograms of plutonium and used about 2 kilograms for its 2006 nuclear test.[109] However, according to NTI, various media reports claimed that the declaration failed to address its alleged uranium enrichment program or suspicions of its nuclear proliferation to other countries, such as Syria.[110] Despite these issues, in return for North Korea's declaration President George W. Bush rescinded the application of the Trading with the Enemy Act toward Pyongyang, and notified Congress of his intention to remove the DPRK from the list of state sponsors of terrorism after 45 days, in accordance with US law.[111]

Following the US government's action, Pyongyang demolished the cooling tower at the Yongbyon reactor.[112] Yet, when the 45-day period expired, the US did not carry out the de-listing. The State Department claimed that the 45-day period was a "minimum" rather than a deadline.[113] In response, the KCNA released a statement by the Foreign Ministry stating that because the US had not carried out its commitment to remove the DPRK from the State Department's terrorism list, Pyongyang would suspend the disablement of its key nuclear facilities at Yongbyon and consider taking steps to restore them "to their original state" (see **Figure 6.2)**[114] The following month, the DPRK asked the IAEA to remove seals and surveillance from the reprocessing plant in Yongbyon.[115] Then in April 2009, North Korea's Foreign Ministry indicated that Pyongyang would withdrawal from the six-party talks and "would no longer be bound" by any of its agreements, saying instead that it would "fully reprocess" the 8,000 spent fuel rods from its Yongbyon reactor in order to extract plutonium for nuclear weapons.[116] Two days later, IAEA inspectors at the Yongbyon nuclear facilities removed safeguards equipment and left the country.[117]

The May 2009 Test

On 25 May 2009, the DPRK issued the following statement: "The Democratic People's Republic of Korea successfully conducted one more underground nuclear test on May 25 as part of the measures to bolster up its nuclear deterrent for self-defense in every way as requested by its scientists and technicians."[118] The US Intelligence Community assessed that the DPRK probably

[108] "North Korea Nuclear Profile," Nuclear Threat Initiative, http://www.nti.org.
[109] "Chronology of US-North Korean Nuclear and Missile Diplomacy," Arms Control Association, http://www.armscontrol.org.
[110] "North Korea Nuclear Profile," Nuclear Threat Initiative, http://www.nti.org.
[111] "Chronology of US-North Korean Nuclear and Missile Diplomacy," Arms Control Association, http://www.armscontrol.org.
[112] "North Korea Nuclear Profile," Nuclear Threat Initiative, http://www.nti.org.
[113] "US Won't Take North Korea Off Terrorism List Yet," *Reuters* (11 Aug 2008).
[114] "Foreign Ministry's Spokesman on DPRK's Decision to Suspend Activities to Disable Nuclear Facilities," KCNA (26 Aug 2008).
[115] "Fact Sheet on DPRK Nuclear Safeguards," International Atomic Energy Agency, http://www.iaea.org.
[116] " DPRK Foreign Ministry Vehemently Refutes UNSC's "Presidential Statement," KCNA, (14 April 2009).
[117] "Fact Sheet on DPRK Nuclear Safeguards," International Atomic Energy Agency, http://www.iaea.org.
[118] "Text of N. Korean News Report Announcing Nuclear Test," *Washington Post* via *Reuters* (25 May 2009).

conducted an underground nuclear explosion in the vicinity of P'unggye, the explosion yield being approximately a few kilotons.[119]

Most estimates were in range of 4 to 5 kilotons, but an initial Russian statement gave a much higher estimate of 20 kilotons.[120] The test produced seismic signals characteristic of an explosion, indicating that they were generated by human activity, but no radioactive materials were reportedly detected, in contrast to the first test.[121] Verification technology experts such as Professor Paul Richards considered the scenario of a bluff—the creation of a nuclear explosion-like seismic signal using conventional explosives—but while technically possible, he stated that it was highly implausible, seeing as "several thousand tons of conventional explosives to be fired instantaneously would have been virtually impossible under the prevailing circumstances and would not have escaped detection."[122] Still, the test suggested the DPRK had the capability to produce nuclear weapons with a yield of roughly a couple kilotons TNT equivalent.[123]

Facilities

The DPRK possesses numerous known and suspected nuclear facilities—completed, under construction, or in planning (see **Figures 6.3, 6.4 and 6.5**). According to an intelligence source, nuclear weapons probably are stored at the following locations: Yongjŏng-dong, Namp'o City, South P'yŏng'an Province; near Kap'hyŏn-dong, Hŭich'ŏn City, Chagang Province; and Kong'in-dong, Kanggye City, Chagang Province.[124] Additionally, most of North Korea's plutonium-based nuclear installations are located at Yongbyon, 60 miles from the North Korean capital of Pyongyang. As of May 2009, the CRS had data on the following key plutonium installations:[125]

- An atomic reactor, with a capacity of about 5 electrical megawatts that began operating by 1987. It is capable of expending enough reactor fuel to produce about 6 kilograms of plutonium annually—enough for the manufacture of a single atomic bomb annually. As of late 2008, under the agreement reached in six-party talks in 2007, North Korea had completed eight of the eleven steps of the disablement of the reactor, including the removal of equipment from the reactor and the blowing up of reactor's cooling tower.

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[119] Office of the Director of National Intelligence, Public Affairs Office, "Statement by the Office of the Director of National Intelligence on North Korea's Declared Nuclear Test on May 25th, 2009" (15 June, 2009).
[120] Larry A. Niksch, *North Korea's Nuclear Weapons Development and Diplomacy*, Congressional Research Service (27 May 2009) 1.
[121] Jonathan Medalia, *North Korea's 2009 Nuclear Test: Containment, Monitoring, Implications*, Congressional Research Service (24 Nov 2010), 1.
[122] "Experts Sure About the Nature of the DPRK Event," Comprehensive Test Ban Treaty Organization (12 Jun 2009), http://www.ctbto.org.
[123] "Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, Covering 1 January to 31 December 2010," http://www.dni.gov.
[124] *North Korea's Nuclear and Missile Programs- Asia Report No. 168*, International Crisis Group (18 June 2009), 10; Internal government memorandum made available to Crisis Group. However, another intelligence source claimed the US Central Intelligence Agency has "low confidence" in these exact locations because there are several underground facilities in the region, and the weapons could be stored in a number of nearby facilities; Crisis Group interview, Seoul, 7 January 2009.
[125] Larry A. Niksch, *North Korea's Nuclear Weapons Development and Diplomacy*, Congressional Research Service (27 May 2009).

- Two larger (estimated 50 megawatts and 200 electrical megawatts) reactors under construction at Yongbyon and Taechon since 1984. According to US Ambassador Robert Gallucci, these plants, if completed, would be capable of producing enough spent fuel annually for 200 kilograms of plutonium, sufficient to manufacture nearly 30 atomic bombs per year. However, when North Korea re-opened their plutonium program in early 2003, reports indicate that construction on the larger reactors was not resumed.
- A plutonium reprocessing plant about 600 feet long and several stories high. The plant would separate weapons grade plutonium-239 from spent nuclear fuel rods for insertion into the structure of atomic bombs or warheads. IAEA monitors in July 2007 stated that the reprocessing plant was not in operation, and it remained shut down into early 2009.

Additionally, the visit by Dr. Siegfriend Hecker to the DPRK in November 2010 shed additional light on developments in the DPRK's nuclear program, especially regarding the DPRK's potential uranium enrichment programs. Highlights from his trip included:

- A small, recently completed, industrial-scale uranium-enrichment facility. The sight of 2,000 centrifuges and an ultramodern control room stunned Dr. Hecker. "Instead of finding a few dozen first-generation centrifuges, we saw rows of advanced centrifuges, apparently fully operational."[126]
- Initial construction on a small, experimental LWR designed to deliver roughly 25 to 30 megawatts of electric power. "The construction of the reactor raises a number of policy issues: an LWR requires enriched uranium, and once enrichment capabilities are established for reactor fuel, they can be readily reconfigured to produce HEU bomb fuel. …The centrifuge facility…is most likely designed to make reactor, not bomb, fuel, because it would not make sense to construct it in a previously inspected site and show it to foreign visitors. However, it is highly likely that a parallel covert facility capable of HEU production exists elsewhere in the country."[127]
- The 5 MWe reactor had not been restarted since it was shut down in July 2007. No new fuel has been produced and the fresh fuel produced prior to 1994 (sufficient for one more reactor core) is still in storage. Pyongyang, has apparently decided not to make more plutonium or plutonium bombs for now. Dr. Hecker's assessment was that they could resume all plutonium operations within approximately six months and make one bomb's worth of plutonium per year for some time to come.[128]

Dr. Siegfried's report was followed by press reports that the IAEA suspected that the DPRK had at least one additional covert centrifuge site, and might have significant additional sites. These reports mean that the DPRK may have significant stocks of enriched uranium, as well as plutonium. A December 2010 CRS report held that, all together, with all facilities operating, the DPRK could produce approximately 6 kg of plutonium per year and an unknown amount of HEU per year depending on the status of their uranium enrichment program.

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[126] Siegfried Hecker, "What I Found in North Korea," *Foreign Affairs* (9 Dec 2010) http://www.foreignaffairs.com.
[127] Siegfried Hecker, "What I Found in North Korea," *Foreign Affairs* (9 Dec 2010) http://www.foreignaffairs.com.
[128] Siegfried Hecker, "A Return Trip to North Korea's Yongbyon Nuclear Complex," Center for International Security and Cooperation (20 Nov 2010), 6.

Figure 6.2 Known Disablement Steps at Yongbyon (as of 20 Jan 2011)

Step	Facility	Status
Discharge of 8000 spent fuel rods to the spent fuel pool	5-megawatt reactor	6400 completed as of April 2009
Removal of control rod drive mechanisms	5-megawatt reactor	To be done after spent fuel removal completed
Removal of reactor cooling loop and wooden cooling tower interior structure	5-megawatt reactor	Tower demolished June 26, 2008
Disablement of fresh fuel rods	Fuel fabrication facility	Not agreed to by DPRK; consultations held Jan. 2009 with ROK on possibility of purchase
Removal and storage of 3 uranium ore concentrate dissolver tanks	Fuel fabrication facility	Completed
Removal and storage of 7 uranium conversion furnaces, including storage of refractory bricks and mortar sand	Fuel fabrication facility	Completed
Removal and storage of both metal casting furnaces and vacuum system, and removal and storage of 8 machining lathes	Fuel fabrication facility	Completed
Cut cable and remove drive mechanism associated with the receiving hot cell door	Reprocessing facility	Completed
Cut two of four steam lines into reprocessing facility	Reprocessing facility	Completed
Removal of the drive mechanisms for the fuel cladding shearing and slitting machines	Reprocessing facility	Completed
Removal of crane and door actuators that permit spent fuel rods to enter the reprocessing facility	Reprocessing facility	Completed
Source: Mary Beth Nikitin, *North Korea's Nuclear Weapons: Technical Issues*, Congressional Research Service (20 Jan 2011), 18.		

Significant future growth in North Korea's arsenal would be possible only if larger reactors were completed and operating and would also depend on any progress in the reported uranium enrichment program. At a minimum, this means the DPRK's future production of weapons grade material is impossible to predict, and that both targeting and arms control are far more difficult because of the inability to predict how many dispersed centrifuge facilities the DPRK may have.

Figure 6.3 North Korean Nuclear Power Reactor Projects (as of January 2011)

Location	Type/Power Capacity	Status	Purpose
Yongbyon	Graphite-moderated Heavy Water Experimental Reactor/5 MWe	Currently shut-down; cooling tower destroyed in June 2009 as part of Six-Party Talks; estimated restart time would be 6 months	Weapons-grade plutonium production
Yongbyon	Graphite-moderated Heavy Water Power Reactor/50 MWe	Never built; Basic construction begun; project halted since 1994	Stated purpose was electricity production; could have been used for weapons-grade plutonium production
Yongbyon	Experimental Light-Water Reactor/100 MWT (25-30 MWe)	US observers saw basic construction begun in November 2010	Stated Purpose was electricity production; could have been used for weapons-grade plutonium production
Taechon	Graphite-moderated Heavy Water Power Reactor/200 MWe	Never built; Basic construction begun; project halted since 1994	Stated purpose was electricity production; could have been used for weapons-grade plutonium production
Sinp'o	4 Light-water reactors/440 MWe	Never built; part of 1985 deal with Soviet Union when DPRK signed the NPT; canceled by Russian Federation in 1992	Stated purpose is electricity production; could have been sued for weapons-grade plutonium production
Sinp'o	2 Light-water reactors (turn-key)/1000 MWe	Never built; part of 1994 Agreed Framework, reactor agreement concluded in 1999; Project terminated in 2006 after DPRK pulled out of Agreed Framework	Electricity production
Source: Mary Beth Nikitin, *North Korea's Nuclear Weapons: Technical Issues*, Congressional Research Service (20 Jan 2011), 8.			

Figure 6.4 IISS List of Major North Korean Nuclear Sites (as of January 2004)

Pakchon	Location of uranium mine and milling facility (known as the April Industrial Enterprise), declared to the IAEA in 1992. The uranium milling facility reportedly processes ore from mines in the Sunchon area. Current status is unknown.
Pyongsan	Location of uranium mining and a uranium milling facility, declared to the IAEA in 1992. The milling facility in Pyongsan reportedly processes ore from the Pyongsan and Kumchon uranium mines. Current status is unknown.
Pyongyang	Laboratory-scale hot cells, provided by the Soviet Union in the 1960s
Sinpo	Location of two 1,000 MWe light water reactors being constructed by the Korean Energy Developmental Organization (KEDO) under the terms of the Agreed Framework, which set a target date of 2003 for completion of the project. Various events have delayed the project.
Sunchon	Location of an important uranium mine.
Taechon	Location of incomplete 200MWe graphite-moderated nuclear power reactor. Construction began in 1989 and was frozen in 1994 (under the 1994 Agreed Framework). Current status is unknown.
Yongbyon	Location of a Nuclear Research Center, comprising a 5MWe graphite moderated prototype power reactor, reprocessing facility, uranium conversion plant, fuel fabrication plant, and spent fuel and waste storage facilities. Also location. Also location of a Soviet-supplied IRT research reactor and radioisotope laboratory.
Youngdoktong	Reported location of site (active in the 1990s) for nuclear weapons-related high-explosive testing
Source: John Chipman, *North Korea's Weapons Programmes: A Net Assessment,* IISS (21 Jan 2004), 46; Carnegie Endowment for International Peace, www.ceip.org; Federation of American Scientists, www.fas.org; Nuclear Threat Initiative, www.nti.org; and David Albright and Kevin O'Neill, *Solving the North Korean Nuclear Puzzle*, (Washington, DC: The Institute for Science and International Security, 2000).	

Figure 6.5 Map of Major North Korean Nuclear Sites

Note: Locations on map are approximate.
Source: John Chipman, *North Korea's Weapons Programmes: A Net Assessment*, IISS (21 Jan 2004), 45

Recent Developments

The DPRK has unfrozen its plutonium program and instigated a highly enriched uranium program—efforts in violation of the 1991 North-South denuclearization agreement, the 1994 Agreed Framework, and the basic tenants agreed upon in the six-party talks. As a result, arms control negotiations on the peninsula seem to have come unglued. According to Dr. Christopher Ford, "there seems to be increasing agreement across the breadth of the US policy community

that there is little to be gained from further engagement."[129] If such is the case, the DPRK may continue to pursue an advanced weapons program as a deterrent to perceived American and ROK aggression, which could pose a threat to the existing force balance on the peninsula.

Probable Weaponization

As has been noted earlier, there is no way to be certain of the DPRK's progress in weaponing nuclear weapons. Moreover, experts debate the number of nuclear weapons it could now make and can acquire in the near term, and critical areas on uncertainty like its access to Chinese designs and the level of technology sharing with Iran and Syria.

To date, the DPRK has only conducted two low yield nuclear tests—one on October 9, 2006 with a yield of less than one kiloton, and one on May 25, 2009, with a yield of a few kilotons. This compares with a yield that would have been at least three to five times higher (20 kilotons) even in an efficient fission weapons system. This indicates that it may be years before the DPRK can develop high yield boosted weapons or the megaton and thermally dominated yields of fusion weapons. While no one can dismiss a low yield fission weapon, it is very different in war fighting lethality and deterrent impact from a high yield weapon, and presents substantial problems in deploying long-range missiles where the operational accuracy can be more in tens of kilometers than several hundred meters.

While US officials do not know whether the DPRK has achieved weaponization of its arsenal, they assess it has the capability to do so.[130] The common assumption is that Pyongyang's current nuclear weapon designs are, or will be, based on a first generation implosion device, the logical choice for states in the initial stage of nuclear weapon development.[131] Data collected from the DPRK's May 2009 nuclear test suggests the DPRK has the capability to produce nuclear weapons with a yield of roughly a couple kilotons TNT equivalent.[132] Additionally, experts estimate that no DPRK nuclear bombs have not been transferred to the KPA; Kim Jong-il apparently maintains control of them, possibly through the Second Economic Committee, which is responsible for the production of weapons and military equipment, including missiles and nuclear weapons.[133]

DPRK Missile Developments

The DPRK gives high priority to the development of ballistic missiles for several reasons. These include political and diplomatic considerations and earning foreign currency, as well as efforts to enhance its military capabilities on a regional basis and shape Korean military balance in its

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[129] Dr, Christopher A Ford, "Challenges of North Korean Nuclear Negotiation," *DPRK-US Dialogue,* Aspen Policy Program (2011).
[130] Dennis Blair, "Annual Threat Assessment of the US Intelligence Community," US Senate Select Committee on Intelligence (2 Feb 2010), http://www.dni.gov.
[131] John Chipman, *North Korea's Weapons Programmes: A Net Assessment*, IISS (21 Jan 2004), 45.
[132] "Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, Covering 1 January to 31 December 2010," http://www.dni.gov.
[133] *North Korea's Nuclear and Missile Programs- Asia Report No. 168,* International Crisis Group (18 June 2009), 12.

favor. Unfortunately, there are as many uncertainties in predicting the nature of the DPRK's missile programs as there are in predicting its nuclear program. The DPRK's ambitious missile programs are still largely in development, and their capabilities are impossible to predict because there have not been enough tests of the DPRK's longer-range missiles to provide a clear picture of their performance.

These uncertainties make it impossible to estimate any of these missiles' reliability and operational accuracy, and whether the DPRK has anything approaching some form of terminal guidance technology.[134] Nevertheless, DPRK advancements in missile technology coupled with its nuclear ambitions does cause deep concern among ROK and Western sources. US Secretary of Defense Robert M. Gates warned in January 2010

> With the DPRK's continuing development of nuclear weapons and their development of intercontinental ballistic missiles, North Korea is becoming a direct threat to the United States, and we have to take that into account…I think that North Korea will have developed an intercontinental ballistic missile (within five years) … Not that they will have huge numbers or anything like that, but they will have - I believe they will have a very limited capability.[135]

The DPRK has hundreds of ballistic missiles, along with a significant infrastructure and institutional arrangement to sustain its missile development program. After the short-range *Hwasŏng-5* (a DPRK version of the Soviet Scud-B) began serial production in 1987, DPRK missile development accelerated at a remarkable pace. During a 5-year period (1987-92), the country began developing the *Hwasŏng-6* (a DPRK version of the Soviet Scud-C), the medium-range *Nodong*, the long-range *Taepodong-1* and *Taepodong-2*, and the *Musudan* (a road-mobile version of the Soviet R-27/SS-N-6 "Serb" submarine-launched ballistic missile).[136] North Korea has successfully flight tested the *Hwasŏng-5/6* and the *Nodong*; however, the *Taepodong-1* was only partially successful in 1998, and the *Taepodong-2* failed after about 40-42 seconds during its first test in 2006 and was partially successful in a subsequent test in 2009.[137] (See **Figure 6.6**)

Sources vary, but on average Pyongyang possesses approximately between 600-800 *Hwasŏng-5/6*s that can strike the ROK and as many as 320 *Nodong* missiles that can strike as far as Japan. Long-range missiles, like the *Taepodong-1/2*, with the potential to hit the continental US and other international targets are still under development.[138] However, it is possible that the DPRK possesses upwards of ten *Taepodong* missiles.[139] At present, the DPRK appears to be developing not only ballistic missiles, but also an intermediate-range ballistic missile and a solid fuel propellant short-range missile, the *Musudan* and *Toska* respectively. The DPRK is also making

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[134] See Joseph S. Bermudez, "Going Ballistic – The DPRK's Advanced Missile Capabilities, " *Jane's Intelligence Review*, 2009;" Daniel A. Pinkston, *The North Korean Ballistic Missile Program*, Strategic Studies Institute, US Army War College, February, 2008.

[135] "US Warns on North Korea Missile Threat," BBC (11 Jan 2011); Elisabeth Bumiller and David E. Sanger, "Gates Warns of North Korea Missile Threat to US*" The New York Times* 11 Jan 2011).

[136] Daniel Pinkston, *The North Korean Ballistic Missile Program*, US Army Strategic Studies Institute (Feb 2008), vi-vii.

[137] Daniel Pinkston, *The North Korean Ballistic Missile Program*, US Army Strategic Studies Institute (Feb 2008), vi-vii.

[138] *North Korea's Nuclear and Missile Programs – Asia Report No. 168*, International Crisis Group (18 June 2009),1.

[139] "North Korea Profile – Missiles (Introduction)," Nuclear Threat Initiative, http://www.nti.org.

efforts to improve existing ballistic missiles such as the *Hwasŏng* and *Nodong*, including an attempt to extend their ranges.[140] (See **Figures 6.7-6.10**)

Figure 6.6 ROK Ministry of National Defense DPRK Missile Timeline (as of 2008)

Time	Development and Production Activities
Early 70s	Involved in China's missile development project and acquired missile technology (estimation)
1976-81	Introduction of USSR-made Scud-Bs and launchers from Egypt
April 1984	First test-firing of improved Scud-B
May 1986	Test-firing of Scud-C
1988	Operational deployment of improved Scud-B/C
May 1990	First test-firing of the Nodong missile
June 1991	Launching of the Scud-C Missile
May 1993	Test-firing of the Nodong missile
January 1994	First identification of the Taepodong-1
1998	Operational deployment of Nodong missiles
August 1998	Test-firing of the Taepodong-1 (DPRK claims satellite launch)
July 2006	Test-firing of the Taepodong-2 and launching of Nodong and Scud missile
2007	Operational deployment of IRBM (likely the Musudan)
Source: *White Paper 2008*, Republic of Korea Ministry of Defense, p. 331. Operational	

The DPRK is nearly self-sufficient in ballistic missile production, but still relies upon some advanced foreign technologies and components, particularly for guidance systems. The country has an extensive machine tool sector; thus, Pyongyang is probably self-sufficient in the fabrication of airframes, tanks, tubing, and other basic components.[141] However, the DPRK's rapid strides in the development of its ballistic missiles with only a limited number of test launches could possibly mean that the country imported various materials and technologies from outside.[142]

[140] *Defense of Japan 2010*, Japan Ministry of Defense, 45.
[141] Daniel Pinkston, *The North Korean Ballistic Missile Program*, US Army Strategic Studies Institute (Feb 2008), 21.
[142] "Defense of Japan 2010," Japan Ministry of Defense, p.45

Figure 6.7 DPRK Missile Arsenal

Classification	Range (km)			Payload (kg)			Operational Status		
	ROK	ICG	MT.Com	ROK	ICG	MT.Com	ROK	ICG	MT.Com
Hwasŏng-5	300	300	300	1000	990	985	Operational	--	Operational
Hwasŏng-6	500	500	500	770	770	700	Operational	--	Operational
Nodong	1300	1000	1300	700	700	1200	Operational	--	Operational
Musudan	3000	3000-4000	3200	650	--	1000-2000	Operational	--	Unknown
Taepodong-1	2500	2200	2000	500	--	--	Test-fired	--	Operational
Taepodong-2	6700	6700	6000-9000	650-1000	--	--	Developmental	--	Developmental
Toska	--	120	120-160	--	485	485	--	--	Operational

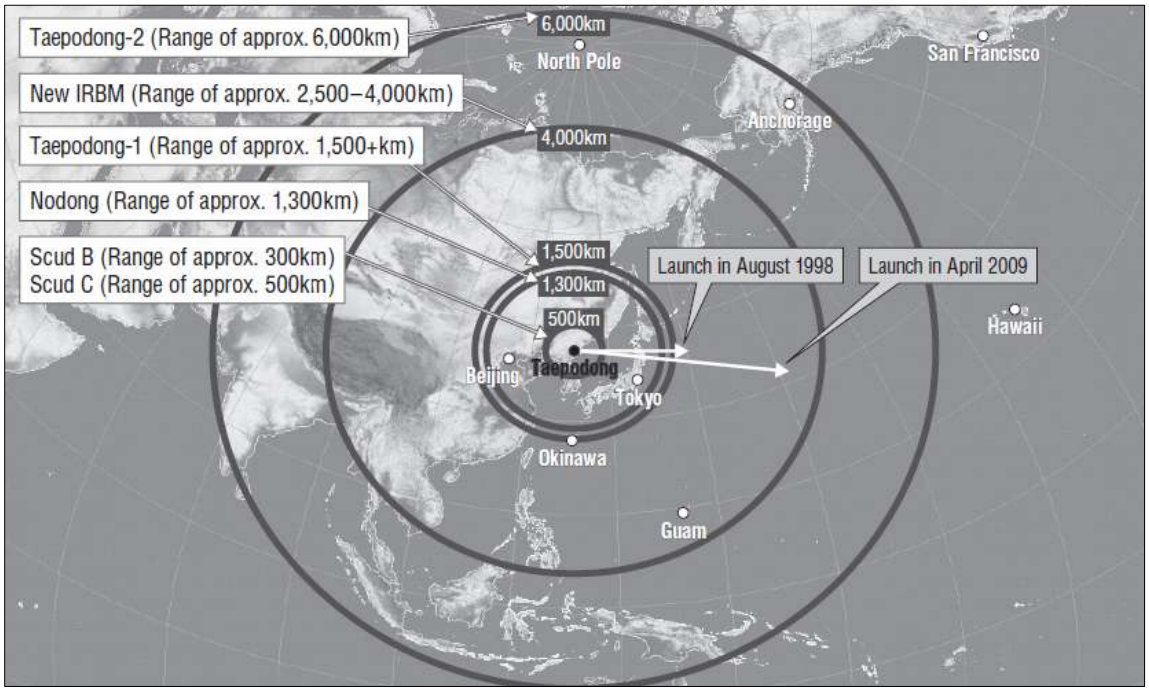
Note: 'ROK' represents ROK Ministry of National Defense data; 'ICG' represents International Crisis Group data; 'MT.Com' represents MissileThreat.com data.

Source: "Appendix 6," *2008 White Paper*, ROK Ministry of National Defense; *North Korea's Nuclear and Missile Programs-Asia Report No. 168*, International Crisis Group (18 June 2009), 31; "Ballistic Missiles of the World," MissileThreat.com, http://www.missilethreat.com.

Figure 6.8 ROK Ministry of National Defense Estimates of DPRK Missile Range

Source: *White Paper 2008*, Republic of Korea Ministry of Defense, 39.

Figure 6.9 Japanese Ministry of Defense Estimates of DPRK Missile Range



Note: Represent range when launched from the Taepong District of the DPRK
Source: *Defense of Japan 2010*, Japan Ministry of Defense, 43

The Hwasŏng and Toksa Programs

The DPRK possesses a large SRBM stockpile primarily based on different versions of the Russian Scud missile that can easily strike targets within the ROK. They are domestically produced and have a max range of approximately 500km.[143] The first North Korean Scud-B versions were flight tested in April 1984, and successful flight tests of the Scud-B (*Hwasŏng-5*) and Scud-C (*Hwasŏng-6*) were conducted in May 1986 and July 1986 respectively.[144] Both were subsequently deployed by 1988. Some estimates indicate that the DPRK's SRBMs include some 600-800 regular and extended-range Scud missiles,. According to additional estimates, Pyongyang may deploy its missiles in two belts, in 22-28 bases with 12-15 in the rear area. The first is 50-90 kilometers north of the DMZ, and the second 90-120 kilometer north. A third belt may exist more than 175 kilometers from the border.[145] These warheads are probably equipped with high-explosive munitions, but it is also possible they have been fitted with chemical and biological weapons but most likely not nuclear; the relative crudeness of the Scud design makes it unlikely that the DPRK will equip it with a nuclear warhead.[146]

The DPRK has recently been seeking ways to improve its Scud arsenal and developing new short-range missile platforms. A May 2009 CRS report stated that in 2006 the DPRK tested newer versions of "solid-fuel Scuds, which can be fired quickly, in contrast to liquid-fuel missiles."[147] And based on interviews with ROK officials, the International Crisis Group reported that in 2008:

> North Korea also unveiled a new solid-fuelled short-range tactical missile, the *"Toksa"* (Viper) or KN-02, but it is unclear whether it has been deployed. It is a North Korean version of the Soviet/Russian *Tochka* (SS-21 Scarab) but has a range of only about 120km. However, it is much more accurate than the North's other missiles and could strike the Seoul-Incheŏn metropolitan area and possibly US military bases in P'yŏngt'aek, south of Seoul.[148]

Initial production probably began in 2006. They were displayed during a military parade in April 2007 and probably entered service in 2008.[149]

The Nodong

The DPRK is thought to have started its development of longer-range ballistic missiles in the 1990s with the *Nodong* (or *Rodong*) program. Much of the information about the missile stems from a comparison with the *Ghauri* missile of Pakistan and the *Shahab 3* of Iran, which all seem to be related missile programs.[150] The *Nodong* is a liquid fuel propellant single-stage ballistic missile and is assessed to have a range of about 1,300km, within reach of almost all of Japan (see

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[143] *North Korea's Nuclear and Missile Programs-Asia Report No. 168*, International Crisis Group (18 June 2009), 9.
[144] *North Korea's Nuclear and Missile Programs-Asia Report No. 168*, International Crisis Group (18 June 2009), 7.
[145] Joseph S. Bermudez, "Going Ballistic – The DPRK's Advanced Missile Capabilities, " *Jane's Intelligence Review* (2009).
[146] "Scud B Variant," *Missiles of the World*, Missilethreat.com, http://www.missilethreat.com.
[147] Larry A. Niksch, *North Korea's Nuclear Weapons Development and Diplomacy*, Congressional Research Service, (27 May 2009), 18.
[148] *North Korea's Nuclear and Missile Programs-Asia Report No. 168*, International Crisis Group (18 June 2009), 9.
[149] "KN-02," *Missiles of the World*, Missilethreat.com, http://www.missilethreat.com.
[150] "No Dong-1," *Missiles of the Work*, Missilethreat.com, http://www.missilethreat.com.

Figure 6.8, 6.9, and 6.10)[151] *Nodong* missiles are road-mobile and liquid-fueled, and generally are stored underground and transported to sites that are little more than concrete slabs for launch, which would make it difficult to detect signs of preparation for a launch.[152]

Some experts feel DPRK nuclear weapons would be launched from the *Nodong* missile division headquarters in Yongnim-ŭp, Yongnim-kun, Chagang Province. There are three *Nodong* missile regiments in the division: The first is headquartered in Sino-ri, Unjŏn-kun, North P'yŏng'an Province (near the west coast, about 100km from the Chinese border); the second is headquartered in Yŏngjŏ-ri, Kimhyŏngjik-kun, Yanggang Province (in the centre of the country, about twenty kilometers from the Chinese border); the third is located along with the Nodong missile division in Yongnim-ŭp (in the center of the country about 45-50km from Kanggye City, and about 50-60km from Hŭich'ŏn City).[153] The accuracy is extremely low for modern missiles; thus, it is useless against a hardened military targets and would only be effective against large, soft targets like cities, airports, or harbors.[154]

Approximately 200 *Nodong* missiles are said to be deployed, but the program is still developmental and requires large numbers of additional, full range, tests to become a mature program. The Japanese Defense White Paper believes tests are limited to a possible launch into the Japan Sea in late May 1993, a mix of Scud and *Nodong* launches on July 5, 2006, and a mix of launches that might have involved some *Nodongs* from the Kittareryong district of the DPRK on July 4, 2009.[155] No unclassified source, however, provides a clear picture of exactly what happened during these tests or how far the DPRK has progressed in bringing the system to the final development stage.

The Taepogong Program

The DPRK initiated the development of two ballistic missiles known to the West as *Taepodong 1* and *Taepodong 2* in the early 1990s. The *Taepodongs* are not production missiles and have never been successfully tested as a weapons platform—both have only been tested as a space launcher, not as a ballistic missile.[156] The *Taepodong-1* has an estimated range of at least approximately 1500km, and is assumed to be a two-stage, liquid fuel propellant ballistic missile with a *Nodong* used as its first stage and a Scud used as its second stage. The *Taepodong-1* has been launched only as an SLV in August 1998, but it failed to deliver a satellite into orbit (see

[151] "Defense of Japan 2010," Japanese Ministry of Defense, p.43
[152] Daniel Pinkston, "The North Korean Ballistic Missile Program," *US Army Strategic Studies Institute* (Feb 2008) p.47
[153] Internal government memorandum made available to Crisis Group "North Korea's Nuclear and Missile Programs," *International Crisis Group*, Asia Report No. 168 (18 June 2009) p.13.
[154] "No Dong-1," *Missiles of the Work*, Missilethreat.com, http://www.missilethreat.com/missilesoftheworld/id.82/missile_detail.asp
[155]See Joseph S. Bermudez, "Going Ballistic – The DPRK's Advanced Missile Capabilities, " *Jane's Intelligence Review* (2009);" Daniel A. Pinkston, *The North Korean Ballistic Missile Program*, Strategic Studies Institute, US Army War College (February, 2008); and *2010 Defense White Paper*, Japanese Ministry of Defense, 43-35.
[156] "North Korea's Taepodong and Unha Missiles," *Federation of American Scientists* (March 2009) http://www.fas.org/programs/ssp/nukes/nuclearweapons/Taepodong.html

Figure 6.9).[157] Following the test, the *Taepodong-1* program was ended, indicating it may have been a transitory program for the development of the longer-ranged *Taepodong-2*.[158]

The *Taepodong-2* is a two-stage missile with a new booster resembling the Chinese CSS-2 and CSS-3 first stage and a *Nodong* as its second stage.[159] It is currently North Korea's only true ICBM. Range and payload estimates vary, and while the missile has very limited accuracy, it is thought to be targeted at major US population centers in both Alaska and Hawaii, and perhaps even as far as California.[160]

A 2009 CRS report stated, "The two-stage variant is assessed by some to have a range potential of as much as 3750 km with a 700 to 1,000 kg payload and, if a third stage were added, some believe that range could be extended to 4,000 to 4,300 km. Some analysts further believe that the *Taepodong* 2 could deliver a 700 to 1000 kg payload as far as 6700 km."[161]

David Wright of the Union of Concerned Scientists has calculated that the *Taepodong-2*, used as a ballistic missile, could deliver a 500 kg payload as far as 9,000 kilometers, putting San Francisco within range and all US cities along the Pacific coast north of there.[162] While this would be a significant increase in range over the DPRK's current missiles, it does not represent, as Wright states, "a true intercontinental nuclear delivery capability since developing a first generation warhead and heat shield with a mass of 500 kg or less is likely to be a significant challenge for North Korea."[163]

Like the *Taepodong-1*, the *Taepodong-2* has never been launched as a warhead, and it is not clear whether its missile engines have been used as an SLV. The Japanese Defense White Paper for 2010 reported one failed launch occurred in July 2006 (crashing after forty seconds of flight), and a second launch in April 2009 where the DPRK fired a missile that may have been a *Tapeodong* 2 into the sea at a range over 3000 kilometers (see **Figure 6.11**).[164] The DPRK hailed the 2009 test as a major success—even bragging that the supposed satellite payload was now broadcasting patriotic tunes from space—but military and private experts said that in

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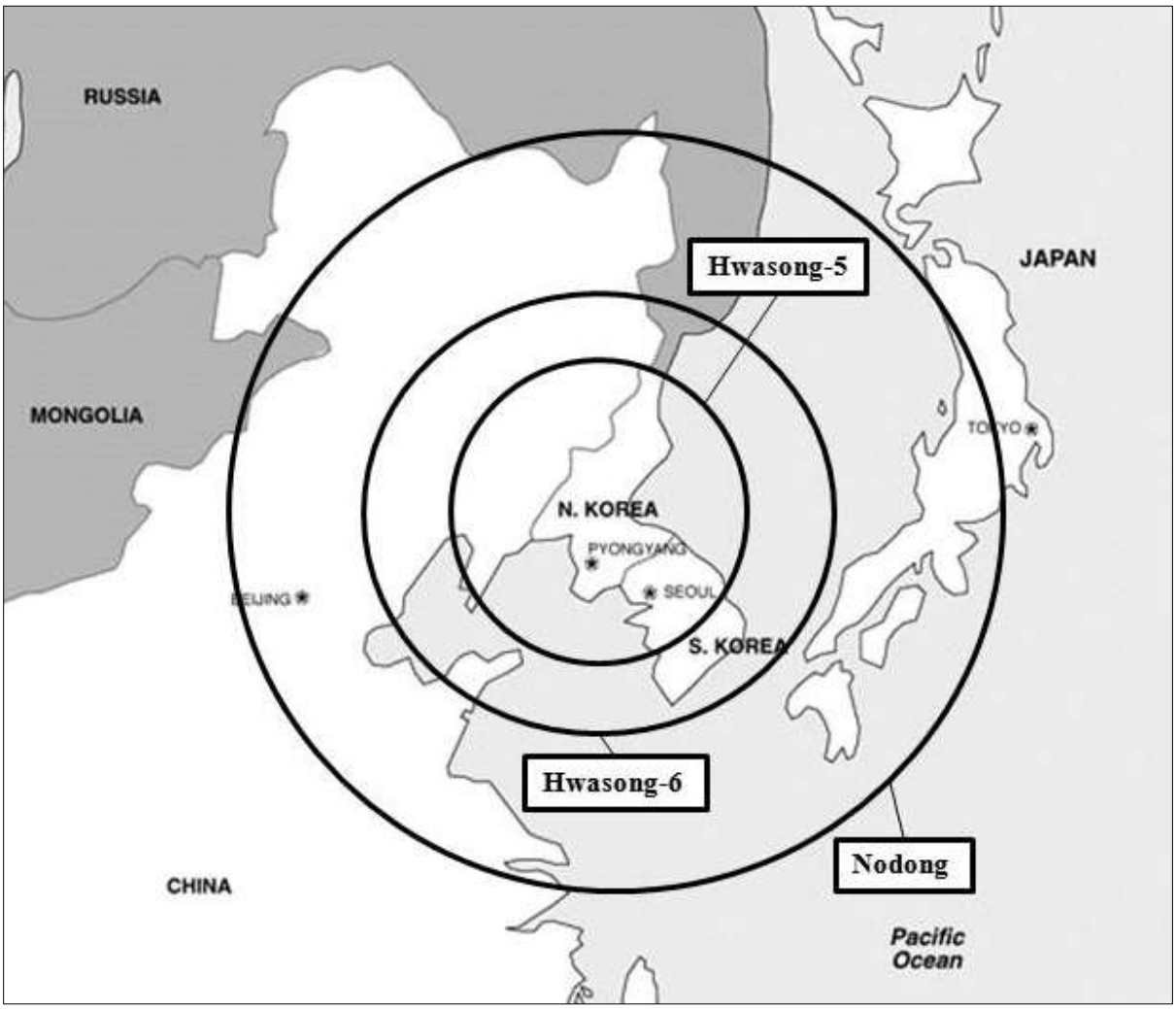
[157] "North Korea's Nuclear Program," *The New York Times*, http://topics.nytimes.com.
[158] "Defense of Japan 2010," Japanese Ministry of Defense, 44
[159] Steven A. Hildreth, "North Korean Ballistic Missile Threat to the United States" *Congressional Research Service* (24 Feb 2009) http://www.fas.org/sgp/crs/nuke/RS21473.pdf.
[160] "Taepodon-2," *Missiles of the World*, Missilethreat.com, http://www.missilethreat.com/missilesoftheworld/id.166/missile_detail.asp
[161] Steven A. Hildreth, "North Korean Ballistic Missile Threat to the United States" *Congressional Research Service* (24 Feb 2009) http://www.fas.org/sgp/crs/nuke/RS21473.pdf.
[162] David C. Wright, "An Analysis of North Korea's Unha-2 Launch Vehicle," David Wright (18 March 2009) http://www.ucsusa.org/assets/documents/nwgs/Wright-Analysis-of-NK-launcher-3-18-09.pdf
[163] David C. Wright, "An Analysis of North Korea's Unha-2 Launch Vehicle," David Wright (18 March 2009) http://www.ucsusa.org/assets/documents/nwgs/Wright-Analysis-of-NK-launcher-3-18-09.pdf
[164]See Joseph S. Bermudez, "Going Ballistic – The DPRK's Advanced Missile Capabilities, " *Jane's Intelligence Review* (2009);" Daniel A. Pinkston, *The North Korean Ballistic Missile Program*, Strategic Studies Institute, US Army War College (February 2008); and *2010 Defense White Paper*, Japanese Ministry of Defense 43-35.

fact North Korea had failed in its highly vaunted effort to fire a satellite into orbit, citing detailed tracking data showed the missile and payload fell into the sea.[165]

Figure 6.10 Estimates of DPRK Missile Range – Northeast Asia

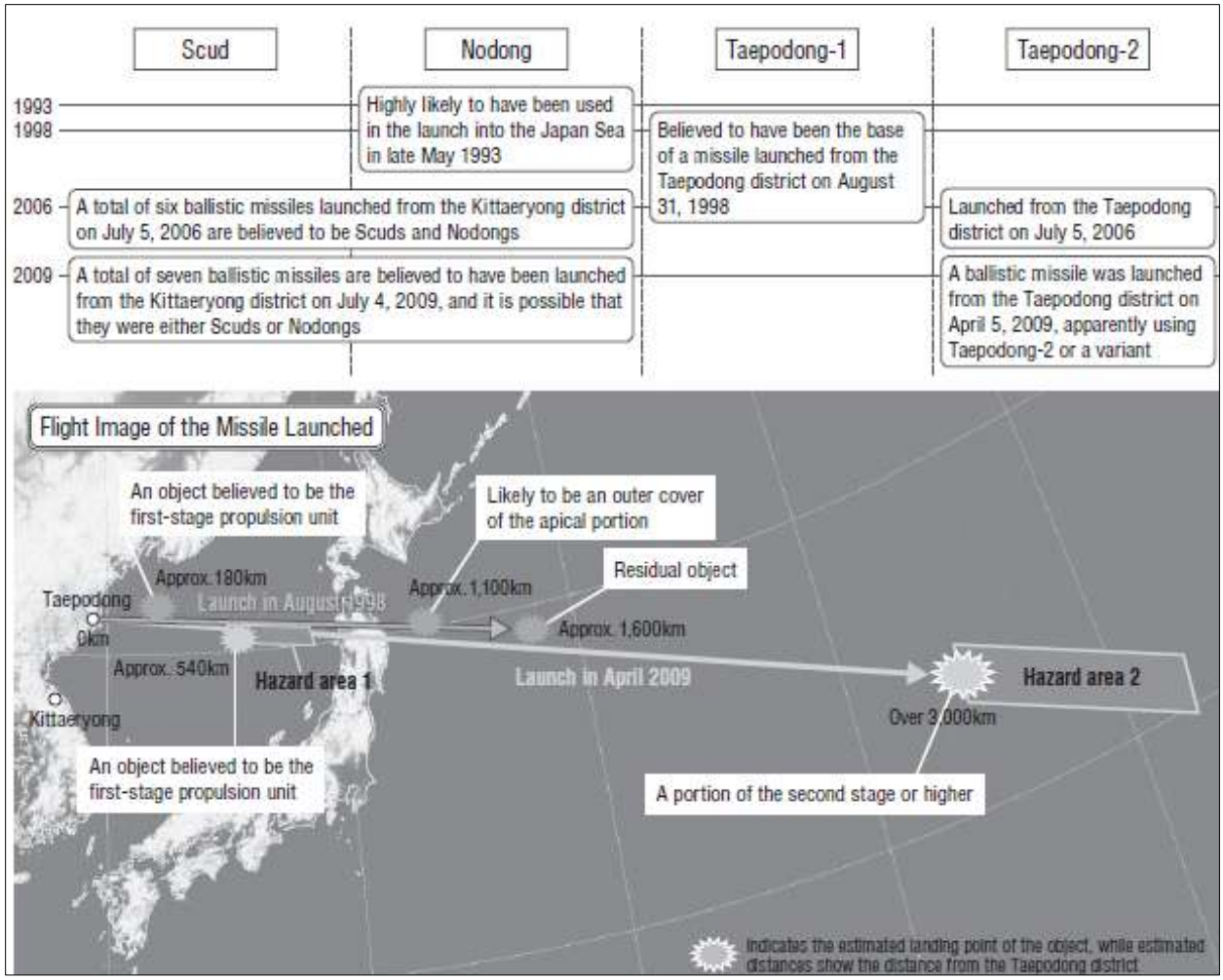


Note: Distances are approximate
Source: "North Korea's Nuclear and Missile Programs," Asia Report No. 168, International Crisis Group, (18 June 2009), p.28.

It is probable that the DPRK tested critical technologies during the test, such as increasing the size of propulsion, separation of the multi-staged propulsion devices, and altitude control.[166] However, because the test only flew 3200 km, it is probable that the *Taepodong-2* is not currently capable of the estimated ranges around 6000 km. Yet, the improvements made to the *Taepodong-2* apparent in the 2009 test show that the DPRK has the ability to improve upon their current programs as well as build a new generation of ballistic missiles capable of reaching targets in the continental US.

[165] "North Korea's Nuclear Program," *The New York Times*, http://topics.nytimes.com.
[166] "Defense of Japan 2010," Japanese Ministry of Defense, p.44-45

Figure 6.11 DPRK Missile Launches



Source: *Defense of Japan 2010*, Japan Ministry of Defense, p.44.

The Musadan

There are reports that the DPRK has also developed since 2003 a more accurate, longer-range intermediate ballistic missile dubbed the *Musudan*. Although it was reportedly first displayed during a military parade in 2007, the October 2010 parade was the first time the missile has been shown to Western audiences.[167] The *Musudan* appears to be based on the design of the Soviet SS-N-6 missile, an intermediate range, liquid propellant, submarine-launched ballistic missile deployed by Russia in the 1960s.[168]

[167] Catherine Boye and Melissa Hanham, "Missiles, Maneuvers and Mysteries: Review of Recent Developments in North Korea," *Center for Non-Proliferation Studies* (2 Nov 2010) http://cns.miis.edu/stories/101102_missiles_north_korea.htm#fn9
[168] Catherine Boye and Melissa Hanham, "Missiles, Maneuvers and Mysteries: Review of Recent Developments in North Korea," *Center for Non-Proliferation Studies* (2 Nov 2010) http://cns.miis.edu/stories/101102_missiles_north_korea.htm#fn9

The range of the missile is disputed among intelligence sources—Israeli sources identified North Korean SS-N-6 based missiles in Iran with a range of 2500 km, and American sources have reported a range of 3200 km.[169] Using a range of 3200 km, the *Musudan* could hit any target in East Asia (including US bases in Guam and Okinawa) and Hawaii.[170] There is also limited evidence suggesting that North Korea tested the *Musudan* as part of its July 2006 missile tests. This is supported by the fact that the electronic signals detected from the missiles did not match North Korea's *Nodong* or Scud missiles and analysis of the flight discounts the likelihood of it being a Scud.[171]

Although reports indicate that the design of any such missile is borrowed from a Russian submarine-launched missile, North Korea probably intends to transport and fire the missile using wheeled transport erector launchers (TEL) units or ship-based launchers.[172] The missile has probably not been flight tested, and it is uncertain whether it is operational, but ROK Intelligence sources believe the Musudan missile division has three regiments and is headquartered in Yangdŏk-kun, South P'yŏng'an Province, about 80km east of Pyongyang.[173]

Facilities

Data on DPRK production and launch facilities for its missile programs is sparse, but some information is available. The No. 125 Factory, the so-called "Pyongyang Pig Factory" in northwestern Pyongyang, reportedly produces *Hwasŏng*, *Nodong*, and surface-to-ship cruise missiles. Officials from Middle Eastern countries have reportedly visited the factory, but the extent of their tours is unknown.[174] This facility is probably the same facility known as the "San'ŭm-dong Factory" or "San'ŭm-dong Missile Research Center."[175]

Additionally, Man'gyŏngdae Electric Machinery Factory is another reported missile production facility located in the same general area of Pyongyang as the No. 125 Factory that reportedly produces *Nodong* and surface-to-ship cruise missiles.[176] The Number Seven Factory, located about five miles from the Electric Machine Factory is responsible for the production and testing of missile prototypes prior to the initiation of production at other plants.[177]

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[169] Bermudez, Joseph., "Japan reveals name of North Korea's R-27 IRBM," *Jane's Defense Weekly*, Vol. 44, Iss. 21 (23May 2007) 4.
[170] Larry A. Niksch, "North Korea's Nuclear Weapons Development and Diplomacy," *Congressional Research Service* (27 May 2009) p. 18.
[171] "N.Korea May Have Tested New Longer-Range Missiles." Chosun Ilbo (18 July 2006) english.chosun.com; Charles P. Vick, "No-Dong B - North Korea." GlobalSecurity.org (4 December 2007) www.globalsecurity.org.
[172] "Musadan," *Missiles of the World*, Missilethreat.com, http://www.missilethreat.com/missilesoftheworld/id.185/missile_detail.asp
[173] "North Korea's Nuclear and Missile Programs," *International Crisis Group*, Asia Report No. 168 (18 June 2009) 14.
[174] Daniel Pinkston, "The North Korean Ballistic Missile Program," *US Army Strategic Studies Institute* (Feb 2008) p.45.
[175] "North Korea Profile – Missiles (Facilities)," *Nuclear Threat Initiative*, http://www.nti.org/e_research/profiles/NK/Missile/facilities.html
[176] Daniel Pinkston, "The North Korean Ballistic Missile Program," *US Army Strategic Studies Institute* (Feb 2008) 45.
[177] "North Korea Profile – Missiles (Capabilities)," *Nuclear Threat Initiative*, http://www.nti.org/e_research/profiles/NK/Missile/capabilities.html#hwasong6

The Second Natural Science Academy is the research and development organization in charge of all weapons development in North Korea. The academy probably draws upon human resources from other scientific institutions under the Academy of Sciences, but the extent of this collaboration is unknown.[178] The DPRK has also reportedly integrated their educational institutions into their missile programs.

According to DPRK defectors, the Korea National Defense College in Kanggye, Chagang Province, has a "Rocket Engine Department" and the college provides instruction on the "production, operation procedures, and launching of missiles."[179] North Korea's top universities such as Kim Il Sung University, Kim Chaek University of Technology, and the P'yŏngsŏng College of Science also have programs in science and engineering that would have applications to rocket and missile development.[180]

The DPRK possesses a number of missile bases and launch facilities (see **Figure 6.12**). The Missile Division under the Ministry of the People's Armed Forces commands at least 18 ballistic missile bases in the country.[181] Many of these bases are likely to have a number of alternative launch pads near the missile storage site, which effectively increases the number of locations to launch missiles from their mobile TELs.

The DPRK had previously used a much smaller launch facility in the northeastern part of the country near Musudan-ri for its launches, but recent intelligence has pointed to the construction of a new facility close to China's border in the Northwest. According to Jane's Information Group reporting of 11 September 2008, North Korea has been building a new long-range missile launch site for the past decade.[182] In contrast to the older Musudan-ri facility which has limited capabilities, this new installation, located on the west coast of the country, includes a movable launch pad and a 10-story tall tower capable of supporting the DPRK's largest ballistic missiles and space launch vehicles.

ROK Defense Minister, Lee Sang Hee confirmed the reports and stated that "about 80 percent of the work has been completed and we're watching it closely."[183] *The Washington Post* also reported US intelligence experts saying in February 2011 that satellite imagery indicated that the

[178] "North Korea Profile – Missiles (Facilities)," *Nuclear Threat Initiative,* http://www.nti.org/e_research/profiles/NK/Missile/facilities.html
[179] "North Korea Profile – Missiles (Facilities)," *Nuclear Threat Initiative,* http://www.nti.org/e_research/profiles/NK/Missile/facilities.html
[180] "North Korea Profile – Missiles (Facilities)," *Nuclear Threat Initiative,* http://www.nti.org/e_research/profiles/NK/Missile/facilities.html
[181] "North Korea Profile – Missiles (Facilities)," *Nuclear Threat Initiative,* http://www.nti.org/e_research/profiles/NK/Missile/facilities.html
[182] Joseph S. Bermudez Jr. and Tim Brown, "Ready For Launch? North Korea's New Missile Facility," *Jane's Defence Weekly* (11 September 2008).
[183] "N Korea Builds New Missile Launch Pad: S Korean Minister," *Agence France Presse,* (11 September 2008).

DPRK had constructed a second—and much larger and more modern—missile launch facility, including a large launch pad next to a launch tower that stands more than 100 feet tall.[184]

Figure 6.12 Possible Locations of DPRK Nuclear Warhead and Missile Facilities

Note: Locations are approximate
Source: "North Korea's Nuclear and Missile Programs," *International Crisis Group*, Asia Report No. 168, 18 June 2009, p.30.

[184] Chico Harlan, "North Korea Has Completed Missile Facility, Satellite Imagery Shows," *Washington Post Foreign Service* (16 Feb 2011).

DPRK Chemical/Biological Developments

While Pyongyang openly declares itself to be a nuclear and missile power, it denies possessing chemical or biological weapons or agents.

The DPRK acceded to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction (BWC) in March 1987, but not to the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction (CWC).[185] However, open sources raise major doubts about such claims. A 2000 Department of Defense report to Congress stated,

> We assess North Korea is self-sufficient in the production of chemical components for first generation chemical agents. They have produced munitions stockpiles…of several types of chemical agents, including nerve, choking, blister, and blood. We assess that North Korea has the capability to develop, produce, and weaponize biological warfare agents, to include bacterial spores causing anthrax and smallpox and the bacteria causing the plague and cholera.[186]

As the balance of conventional forces continues to go against it, asymmetric capabilities, including CW and BW, will likely remain an important pillar of DPRK military strategy.

Chemical

The DPRK produced its first experimental chemical weapons during the late 1950s and early 1960s in the wake of the Korean War. Since then, their chemical weapons program has increasingly improved, and today the DPRK ranks among the world's largest possessors of chemical weapons. Virtually all the fire support systems in the DPRK inventory could deliver chemical agents and be employed in offensive military operations. The DPRK is one of only seven countries that has neither signed nor acceded to the Chemical Weapons Convention and is not expected to do so in the near-term due to intrusive inspection and verification requirements mandated by the agreement.[187]

According to a 2006 unclassified CIA report, the DPRK is believed to possess a sizable stockpile of chemical weapons, including, since 1989, the ability to indigenously produce bulk quantities of nerve, blister, choking and blood chemical agents as well as a variety of different filled munitions systems.[188] NTI provides similar data, alleging the DPRK's chemical arsenal to include four of the five major classes of chemical warfare (CW) agents, including phosgene (choking), hydrogen cyanide (blood), mustard (blister), and sarin (nerve agent) (it does not appear to possess nervous system incapacitants such as BZ).[189]

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[185] "Report S/2010/571," UN Security Council (12 May 2010) http://www.securitycouncilreport.org.
[186] "2000 Report to Congress Military Situation on the Korean Peninsula," US Department of Defense (12 Sept 2000) http://www.defense.gov/news/Sep2000/korea09122000.html.
[187] Globalsecurity.org, "Chemical Weapons Program," http://www.globalsecurity.org/wmd/world/dprk/cw.htm.
[188] "Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, 1 July through 31 December 2006," US Central Intelligence Agency.
[189] Nuclear Threat Initiative, "North Korea Profile-Chemical," http://www.nti.org/e_research/profiles/NK/index.html.

Additionally, GlobalSecurity.org estimates that the DPRK may also produce tabun, adamsite, and prussic acid (hydrogen cyanide).[190] However, it may require imports of some specific precursors to produce nerve agents that are relatively more difficult to fabricate than the first generation blister, blood and choking agents.[191] The International Crisis Group and IISS also provide separate tables of possible DPRK CW agents (combined below in **Figure 6.13**).

Other reports indicate that DPRK appears to have increased its CW agent production capacity in the last two decades, and been able to develop and deploy a variety of delivery systems. The country's arsenal includes thousands of artillery of various calibers, hundreds of forward deployed *Hwasong 5/6* missiles, Frog-5, and Frog-7 missiles, capable of being fitted with chemical warheads.[192] According to defector accounts, DPRK 's long-range missiles such as the *Nodong*, and other ballistic rockets and artillery pieces with calibers larger than 80 mm, are capable of delivering CW agents, and beginning in 2002 the DPRK began to substantially increase the number of long-range multiple rocket 280 mm and 320 mm launching systems near the DMZ.[193]

Figure 6.13 DPRK Possible CW Agents

AGENT	AGENT ID	MAJOR EFFECTS
Blister Agents		
Lewisite	HD	Cutaneous (skin): Pain and irritation of eyes and skin followed by blisters and lesions on the skin. Pulmonary (inhalation): runny nose, hoarseness, bloody nose, sinus pain, coughs. Intestinal: diarrhea, nausea, vomiting.
Mustard Agents	L, H	Cutaneous (skin): Pain and irritation of eyes and skin followed by blisters and lesions on the skin. Pulmonary (inhalation): runny nose, hoarseness, bloody nose, sinus pain, coughs. Intestinal: diarrhea, nausea, vomiting.
Choking Agents		
Phosgene	CG	Coughing, blurred vision, shortness of breath, nausea, pulmonary edema, heart failure, death.
Diphosgene	DP	Coughing, blurred vision, shortness of breath, nausea, pulmonary edema, heart failure, death.
Vomiting Agents		
Adamsite	DM	Coughing, severe headache, muscle spasms, chest pains, shortness of breath, nausea, vomiting.
Vomiting Agent	DA	Headache, nausea, vomiting, diarrhea, abdominal cramps

[190] Globalsecurity.org, "Chemical Weapons Program," http://www.globalsecurity.org/wmd/world/dprk/cw.htm.
[191] John Chipman, "North Korea's Weapons Programmes: A Net Assessment," *IISS* (21 Jan 2004), p.49.
[192] Nuclear Threat Initiative, "North Korea Profile," http://www.nti.org/e_research/profiles/NK/index.html.
[193] Nuclear Threat Initiative, "North Korea Profile-Chemical," http://www.nti.org/e_research/profiles/NK/index.html.

Chloropicrin	PS	Coughing, severe skin irritation on contact, corneal edema and liquefaction of the cornea, pulmonary edema
Tear Gas	CN	Tears, coughing, mucus, burning in the nose and throat, disorientation, dizziness restricted breathing, burning of the skin.
Tear Gas	CS	Tears, coughing, mucus, burning in the nose and throat, disorientation, dizziness restricted breathing, burning of the skin.
Blood Agents		
Cyanide (Hydrogen Cyanide/Cyanogen Chloride)	ANCK	Rapid breathing, dizziness, weakness, headache, nausea, vomiting
Nerve Agents		
Tabun	GA	Runny nose, watery eyes, rapid breathing, nausea, leading to unconsciousness, paralysis, respiratory failure, death.
Sarin	GB	Runny nose, watery eyes, rapid breathing, nausea, leading to unconsciousness, paralysis, respiratory failure, death.
Soman	GD	Runny nose, watery eyes, rapid breathing, nausea, leading to unconsciousness, paralysis, respiratory failure, death.
VX	--	Salivation, runny nose, sweating, shortness of breath, leading to muscle spasms, unconsciousness, death.
VE	--	Salivation, runny nose, sweating, shortness of breath, leading to muscle spasms, unconsciousness, death.

For further information see:
• Organization for the Prohibition of Chemical Weapons (OPCW):www.opcw.org/resp/html/cwagents.html
• World Health Organisation (WHO):www.who.int/csr/delibepidemics/biochem_threats.pdf
• Carnegie Endowment for International Peace:www.ceip.org/files/publications/RegimeAppendix7.asp?p=
• NATO Handbook on the Medical Aspects of NBC Defensive Operations AmedP-6(B): www.fas.org/nuke/guide/usa/doctrine/dod/fm8-9/toc.htm
• US Government, the Chemical & Biological Warfare Threat; US Army Medical Research Institute of Chemical Defence, Chemical Casualty Care Division, http://ccc.apgea.army.mil

Source: North Korea's Chemical and Biological Weapons Programs," *International Crisis Group*, Asia Report No. 167, 18 June 2009, p.25; John Chipman, "North Korea's Chemical and Biological Weapons (CBW) Programmes," *North Korea's Weapons Programmes: A Net Assessment*, IISS (21 Jan 2004), p.55.

Official reports and testimonies from North Korean defectors are uncertain, but indicate (see **Figure 6.14**) that the DPRK military could possess between 2,500 and 5,000 metric tons of chemical weapons (it is unclear if this amount includes only CW agents or agents and munitions).[194] This figure has been reinforced by Dr. Cho'ng Yo'ng-sik from the Korea Research

[194] Nuclear Threat Initiative, "North Korea Profile-Chemical," http://www.nti.org/e_research/profiles/NK/index.html.

Institute of Chemical Technology, who estimates that the DPRK is capable of producing an annual 5,000 metric tons of CW agents in times of peace, which could be increased to 12,000 metric tons in times of war.[195]

Kwon Yang-Joo of The Korea Institute for Defense Analyses (KIDA) agreed with this analysis in an October 2010 report, stating that the DPRK is capable of producing "up to 12,000 tonnes [sic] of chemical weapons," which could "contaminate about 2,500 square kilometres [sic] (950 square miles), four times the area of Seoul."[196] This stockpile is not believed to be increasing, however, because there is no indication of what would be a necessary expansion of storage facilities to do so.[197]

The DPRK maintains a number of facilities involved in producing or storing chemical precursors, agents, and weapons (see **Figures 6.15 and 6.16**). GlobalSecurity.org estimates that North Korea has at least eight industrial facilities that can produce chemical agents; however, the production rate and types of munitions are uncertain.[198] Analysis by NTI is more exact, reporting:

> In 2001, an estimated 12 facilities in DPRK produce and/or store raw chemicals, precursors, and CW agents. ROK government officials, relying partly on aerial photographs, determined that the DPRK has eight chemical weapons production facilities, which are located in Hamhung and Hungnam, South Hamgyong Province; Ch'ongjin and Aoji, North Hamgyong Province; Sinuiju, North P'yongan Province; Manp'o, Chaggang Province; and Anju and Sunch'on, South P'yongan Province. In addition, reportedly there are four research and seven storage facilities. Two facilities located proximal to the cities of Kanggye and Sakchu are reportedly equipped to undertake the final preparation and the filling of CW agents into artillery shells. The testing of agents reportedly is also performed at these two locations, possibly in very large underground facilities. The Hamhung Chemical Engineering College appears to be responsible for much of the training of the KPA personnel in CW defense.[199]

International Crisis Group also has reported that North Korea's Second Natural Science Academy conducts weapons-related research and development, and that the main CW research facility is co-located with a production plant in Kanggye City, Chagang Province.[200] In addition, a number of civilian chemical facilities have been implicated in chemical weapons production, such as the Manpo Chemical Factory and Aoji-ri Chemical Complex.[201]

The DPRK has devoted considerable scarce resources to defensive measures aimed at protecting its civilian population and military forces from the effects of chemical weapons. Such measures include extensive training in the use of protective masks, suits, detectors, and decontamination

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[195] Nuclear Threat Initiative, "North Korea Profile," http://www.nti.org/e_research/profiles/NK/index.html
[196] "N.Korea could make 12,000 tons of chemical weapons: expert," *Associated Foreign Press* (13 Oct 2010).
[197] North Korea's Chemical and Biological Weapons Programs," *International Crisis Group*, Asia Report No. 167 (18 June 2009) 7.
[198] Globalsecurity.org, "Chemical Weapons Program," http://www.globalsecurity.org/wmd/world/dprk/cw.htm.
[199] Nuclear Threat Initiative, "North Korea Profile," http://www.nti.org/e_research/profiles/NK/index.html.
[200] "North Korea's Chemical and Biological Weapons Programs," *International Crisis Group*, Asia Report No. 167 (18 June 2009) 7.
[201] John Chipman, "North Korea's Weapons Programmes: A Net Assessment," *IISS* (21 Jan 2004) 56.

systems.[202] The DPRK has chemical defense units at all levels of its force equipped with decontamination and detection equipment, and DPRK military units conduct regular NBC (nuclear-biological-chemical) defensive training exercises in preparation for operations in a chemical environment.[203] Though these measures seem to be focused on a perceived threat from US and ROK forces, they could also support the offensive use of chemical weapons.

Figure 6.14 Defector Reports on DPRK CW Program (as of 2004)

Name	Background	Defector Comment
Yi Chung Kuk	Sergeant in the 18th Nuclear and Chemical Defense Battalion in the early 1990s. Defected in March 1994.	Warned that the DPRK was capable of killing all people in the ROK with chemical and bacterial weapons. Liked the Sunchon Vinalon Complex to the DPRK's CW program
Choi Ju Hwal	Served in the Ministry of Defense from 1968 to 1995. (Acknowledged that he did not have direct knowledge of the CBW program, but he obtained second-hand information from other officials)	As of 1997, the DPRK had stockpiled over 5,000 tons of toxic gases, including nerve gases (sarin, soman, tabun, and V agents), first-generation blister gases (lewisite and mustard gas), and blood agents (hydrogen cyanide and cyanogen chloride). Choi identified numerous facilities associated with CW research and production, including several civilian chemical factories involved in vinalon production.
Yi Sun Ok	Inmate at a DPRK prison. Defected in 1995	Said that some 150 fellow inmates died due to a chemical weapons test.
Hwang Chang Yop	Secretary of the DPRK's Workers Party. Defected in August 1996.	Claimed that the DPRK had both nuclear and chemical armed missiles capable of hitting the ROK and Japan. He quoted the DPRK leadership as saying that the DPRK ranked third or fourth in the world in chemical weapons.
Yi Chun Sun	Commander of a missile station. Defected from the KPA in 1999.	Said that chemical agents are produced in Factory 102.
Yi Mi (pseudonym)	Worked at the Yongbyon nuclear complex. Defected in September 2000.	Said the 304 Lab mainly worked on nuclear weapons development but also conducted research and development in chemical weapons.

Source: John Chipman, "North Korea's Chemical and Biological Weapons (CBW) Programmes," *North Korea's Weapons Programmes: A Net Assessment*, IISS (21 Jan 2004), p.54

[202] Globalsecurity.org, "Chemical Weapons Program," http://www.globalsecurity.org/wmd/world/dprk/cw.htm.
[203] Globalsecurity.org, "Chemical Weapons Program," http://www.globalsecurity.org/wmd/world/dprk/cw.htm.

Figure 6.15 Map of Possible DPRK Chemical Facilities

Note: Locations are approximate
Sources: "North Korea's Chemical and Biological Weapons Programs," International Crisis Group, Asia Report No. 167, 18 June 2009, p.23; John Chipman, "North Korea's Chemical and Biological Weapons (CBW) Programmes," *North Korea's Weapons Programmes: A Net Assessment,* IISS (21 Jan 2004), p.50-52

Figure 6.16 Major DPRK Civilian Chemical Production Facilities (as of 2004)

Aoiji-ri (Haksong-ri) Chemical Complex	Production of methanol, ammonia, ammonium bicarbonate, coal tar derivatives, liquid fuel products. About 3,500 employees. Processes 600,000 tons of lignite coal processing per year; produces 100,000 tons of ammonium bicarbonate and 35,000 tons of methane per year.
April 25th Vinalon Factory (Hamhung)	Produces 540,000 tons per year of fertilizer, herbicides, and pesticides. Other products include ammonia, as well as other chlorine-based pesticides—probably DDT and chlordane, among others.
February 8th Vinalon Complex (Hamhung)	One of the largest chemical facilities in the DPRK. Around 10,000 employees. Comprises about 50 large buildings. Produces 50,000 tons of vinalon and 10,000 tons of movilon per year. Also produces carbide, methanol, sodium hydroxide, livestock feed, sodium carbonate, vinyl chloride, and agricultural insecticide.
Hamhung Chemical Factory	Produces sulphuric acid, nitric acid, ammonia, and fertilizer products.
Hungnam Chemical Fertilizer Complex (Hamhung)	Produces ammonium sulphate, ammonium nitrate, phosphate, and urea. Employs more than 10,000. Production capacity of 1.4 million tons (unclear whether annual capacity or other time period).
Institute of Chemistry, Hamhung	R&D, education, and training in applied chemistry. Established in 1960.
Chongjin Chemical Fiber Complex	Employs around 3,000 people. 300 tons of pesticides, 10,000 tons of other chemical products, and 30,000 tons of synthetic fiber per year. Also produces carbonic acid, formalin, and phenol.
Chongsu Chemical Complex	Production of large quantities of calcium carbide and smaller amounts of phosphate fertilizer and calcium cyanamide.
Hwasong Chemical Factory	Produces agricultural chemicals. 2,500 tons of phenol per year. Unknown iodine capacity.
Hyesan Chemical Factory	Produces as benzol, phenol, and hydrochloric acid.
Manpo Chemical Factory	Produces ammonia, sodium hydroxide, and sulphuric acid.
Namhung Youth Chemical Complex	Produces ammonia, ethylene, fertilizers, fibers, and paper. Annual production capacity of approximately 500,000 tons.
Sariwon Potash Fertizer Complex	Produces Fertilizers—planned production target of 510,000 tons per year of potash fertilizer (unclear whether annual capacity or other time period)

Shinhung Chemical Complex	Produces calcium hypochlorite, caustic soda ,dyes, hydrochloric acid, paints, vinyl chloride, polyvinyl chloride, potassium carbonate, sodium carbonate, sodium bicarbonate, barium chloride, ammonium sulphate fertilizer, magnestized, fertilizer, slag fertilizer, and sulphuric acid fertilizer.
Sinuiju Chemical Fiber Complex	Produces calcium cyanide, chlorine, sodium hydroxide, sulphuric acid, synthetic fiber, paper products. Annual production capacity of 107,000 tons.
Sunchon vinalon Complex	The DPRK's largest chemical production facility with about 50 affiliated factories. First stage of construction completed in 1989; final construction reportedly still not completed as of 2000. Estimated annual production (if completed) of 100,000 tons of vinalon, one million tons of carbide, 750,000 tons of methanol, and 900,000 tons of vinyl chloride.
Sunchon Calcium Cyamide Fertilizer Factory	One of the DPRK's four major fertilizer plants. Produces calcium cyanmide and calcium carbide. Annual chemical production capacity of 100,000-150,000 tons. Probably a part of the Sunchon Vinalon Complex.
Based on information from the Nuclear Threat Initiative's website: www.nti.org/e_research/profiles/NK. This draws on information from documents such as 'DPRK Factories Suspected of Producing Chemical Agents,' FBIS: KPP2001021600106; 'Alleged Locations of DPRK Nuclear, Biological, Chemical Warfare Facilities Mapped,' 6 June 2001, FBIS: KPP20010606000075; 'North Korean Chemical Industry,' FBIS: FTS19981230001322; and 'Chemical Engineering, Experts Described,' 23 December 2999, FBIS: FTS199991223001168. Source: John Chipman, "North Korea's Weapons Programmes: A Net Assessment," IISS (21 Jan 2004), p.50	

Biological

Even less is known about the North Korea biological warfare program than about its chemical warfare program. The DPRK acceded to the Biological and Toxin Weapons Convention (BTWC) in March 1987, but most official estimates conclude that the DPRK possesses the scientists and facilities for producing traditional infectious biological warfare (BW) agents and biological weapons.

North Korea has dual-use facilities that could be used to produce biological agents as well as a munitions industry that could be used to weaponize such agents—a recent DDNI report, reported that "North Korea has a biotechnology infrastructure that could support the production of various BW agents."[204] However, there is not enough information to determine whether Pyongyang has progressed beyond the research and development stage for a biological weapons program and actually possesses stocks of biological weapons. But while the DPRK may not possess ready-to-use weapons, it certainly has the technical abilities to produce them.

According to GlobalSecurity.org, Pyongyang's resources presently include a rudimentary (by

[204] "Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, Covering 1 January to 31 December 2010," March 2011, http://www.fas.org/irp/threat/wmd.htm

Western standards) biotechnology infrastructure that is sufficient to support the production of limited quantities of toxins, as well as viral and bacterial biological warfare agents.[205] BW agents are reportedly cultured in both civilian and military-related research institutes in the DPRK, and, according to NTI, pathogens having possible utility for BW are allegedly being researched and developed by the DPRK include: Bacillus anthracis (anthrax), Clostridium botulinum (produces botulinum toxin that causes botulism), Mycobacterium tuberculosis (tuberculosis), Rickettsia prowazekii (typhus), Salmonella typhi (typhoid), Vibrio cholerae 01 (cholera), Yersinia pestis (plague), Korean hemorrhagic fever virus (hemorrhagic fever), Variola major (smallpox), Yellow fever virus (yellow fever) (see **Figure 6.17**). [206]

Figure 6.17 Possible DPRK Biological Agents

TYPE	SYMPTOMS/CHARACTERISTICS	STATUS
Bacteria		
Bacillus anthracis (Anthrax)	Pulmonary (inhalation): difficulty breathing, exhaustion, toxemia, terminal shock. Cutaneous (skin): itching, small lesions and possible blood poisoning. Intestinal: nausea, fever, diarrhea. Mortality (if untreated): Pulmonary 80-95%; Cutaneous 5-20%; Intestinal 25-60%. Incubation period: Symptoms usually occur with 7 days. Not contagious	Possibly weaponized, with delivery system
Vibrio cholera (Cholera)	Diarrhea, vomiting and leg cramps. Rapid loss of body fluids, dehydration and shock. Mortality (if untreated): 5-10%. Death in 1-3 hours. Not contagious.	Unknown
Yersinia pestis (Plague)	Fever, headache, exhaustion, swollen lymph nodes. Blood infection and pneumonia. Mortality (if untreated): 50-60%. Incubation period: 1-3 days, death in 2-6 days. Contagious.	Unknown
Salmonella Typhi (Typhoid Fever)	Fever, malaise, chills, stomach pains, headache, loss of appetite, rash. Mortality (if untreated): 12-30%.	Unknown
Typhus	Fever, headache, chills, whole body rash, and general pains. Mortality (if untreated): 30-50%. Incubation Period: 6-12 days. Not contagious.	Unknown
Mycobacterium tuberculosis (tuberculosis)	Coughing, chest pain, fatigue, loss of appetite, chills, fever, coughing blood. Mortality (if untreated): 30-50%. Incubation period: 14 days-1year. Contagious.	--
Virus		
Haemorrhagic fever (Korean Strain)	Fever, fatigue, dizziness, muscle aches, exhaustion. Internal bleeding, coma, delirium, and seizures. Mortality (if untreated): 5-15%. Incubation period: 7-17 days. Contagious	Unknown

[205] Globalsecurity.org, "Biological Weapons Program," http://www.globalsecurity.org/wmd/world/dprk/bw.htm
[206] Nuclear Threat Initiative, "North Korea Profile-Biological," http://www.nti.org/e_research/profiles/NK/index.html

Variola (smallpox)	Fever, malaise, aches, rash, crusting scabs. Mortality (if untreated): 30-40%. Incubation: 7-17 days. Contagious.	Unknown
Yellow Fever	High fever, chills, headache, muscle aches, vomiting. Can lead to shock, kidney and liver failure. Mortality (if untreated): 5-40%. Incubation: 3-6 days. Not contagious.	--
Toxin		
Clostridium Botulinum (Botulism)	Nausea, weakness, vomiting, respiratory paralysis. Mortality (if untreated): 60-90%. Incubation: 12-36 hours after inhalation. Death in 24-72 hours. Not contagious.	Unknown
For further information see: -World Health Organization (WHO): www.who.int/csr/delibepidemics/en/annex3May03.pdf -NATO Handbook on the Medical Aspects of NBC Defensive Operations AmedP-6(B): www.fas.org/nuke/guide/usa/doctrine/dod/fm8-9/2toc.htm -US Army Medical Research Institute of Infectious Diseases, USAMRIID's Medical Management of Biological Casualties Handbook:www.usamriid.army.mil/education/bluebook.html -Centres for Disease Control:www.cdc.gov Source: Nuclear Threat Initiative, "North Korea Profile-Biological," http://www.nti.org; John Chipman, "North Korea's Weapons Programmes: A Net Assessment," IISS (21 Jan 2004), p.50		

A number of facilities have been linked to ongoing work in biological weapons research, development, and manufacture (see **Figures 6.18 and 6.19**), although the indicators involved are often uncertain. IISS provided a detailed list and map of possible facilities (see table below). Additionally, a 2009 International Crisis Group report estimated that DPRK maintains at least three possible BW production facilities and seven BW or BW-related research centers, including: the No. 25 Factory in Chŏngju, the Central Biological Weapons Research Institute in Pyongyang and a plant in the City of Munch'ŏn, Kang'wŏn Province.[207] NTI has also reported a number of facilities in addition to the No. 25 Factory linked to BW production. They include:[208]

- The Research Institute of the Armed Forces Ministry (synonymous with the Bacterium Research Institute, Second Academy of Natural Sciences) responsible for developing biological weapons.
- A Biological research facility located in Songch'on County, South P'yongan Province, adjacent to the Onjong-ni chemical weapons facility.
- The National Defense Research Institute and Medical Academy (NDRIMA), which conducts studies on disease pathogens such as the bacteria and viruses, that cause anthrax, cholera, bubonic plague, smallpox, yellow fever, and others.

Few details are known about these facilities or precisely which microorganisms have been or are being weaponized, if any. Regardless, whatever the status of its biological weapons efforts, the DRPK possesses a number of dual-use biotechnology facilities that could be used to research biological weapons agents and produce militarily significant quantities of biological agents.[209]

[207] North Korea's Chemical and Biological Weapons Programs," *International Crisis Group*, Asia Report No. 167 (18 June 2009) 11.
[208] Nuclear Threat Initiative, "North Korea Profile-Biological," http://www.nti.org/e_research/profiles/NK/index.html.
[209] John Chipman, "North Korea's Weapons Programmes: A Net Assessment," *IISS* (21 Jan 2004) p.60.

Figure 6.18 Civilian DPRK Biological Facilities

Aeguk Compound Micrbobe Center	R&D and production of microbial-based fertilizer supplements.
Aeguk Preventative Medicine Production Factory	Comprised ten laboratories and various workshops devoted to R&D and production of vaccines and medicines. The main product has been hepatitis B vaccine.
Branch Academy of Cell and Gene Engineering	One of nine research branches of the Academy of Sciences. Conducts research on cellular biology and genetic engineering.
National Sanitary and Anti-Epidemic Research Center	Provides inoculations against various diseases and administering quarantines.
Endocrinology Institute	Mainly diagnoses and treats diabetes.
Industrial Microbiology Institute	R&D and production of microbial cultures.
Munchon Agar Plant	Agar (growth media) production. As of 1992, the annual agar production capacity was 200 tons.
Pharmaceutical Institute of the Academy of Medical Sciences	R&D of medicaments. Reportedly located in Pyongyang.
Pyongyang Pharmaceutical Factory	As of August 2000, the factory produced seven drugs, including antibiotics and multivitamins. Has received raw materials and support from UNICEF and Diakonie Emergency Aid of Germany.
Synthetic Pharmaceutical Division, Hamhung Clinical Medicine Institute	R&D of medicaments and clinical diagnostics.
Taedonggang Reagent Company	R&D of vaccines. Previously known as the November 19 Institute.

Sources: Nuclear Threat Initiative, www.nti.org; "DPRK's NAS Pursues Cultivation of Stock Bacteria for Microbial Fertilizers", Chungang Ilbo (17 January 2000); "DPRK Korea Donor Update," UNICEF Emergency Programs (7 Aug 2000), www.reliefweb.int; John Chipman, "North Korea's Weapons Programmes: A Net Assessment," IISS (21 Jan 2004), p.50

Figure 6.19 Map of Possible DPRK Civilian Biological Facilities

Source: John Chipman, "North Korea's Weapons Programmes: A Net Assessment," IISS (21 Jan 2004) 57

ROK Nuclear Developments

Although, the ROK once had an ambitious nuclear weapons program of its own, it currently does not possess a nuclear weapons program. Seoul abandoned its program and signed the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) in April 1975 before it had produced any fissile material, and is a state party to the Comprehensive Nuclear Test Ban Treaty (CTBT). However, the ROK does possess a large and extensive civilian nuclear power industry—the world's fifth-largest with 21 reactors providing almost 40% of the ROK's electricity[210]—which, coupled with past weapons research, some estimate could serve as a basis for any plans to develop nuclear weapons in the future should it feel that DPRK nuclear threats and, perhaps, a thawing in the US-ROK alliance again make such a move necessary.

Initial Weapons Research

Nuclear activities were initiated in the ROK when it became a member of the International Atomic Energy Agency in 1957. In 1958 the Atomic Energy Law was passed and in 1959 the Office of Atomic Energy was established by the government. The first nuclear reactor to achieve criticality in South Korea was a small research unit in 1962.[211]

The ROK apparently began considering developing nuclear weapons in the late 1960s when it began to have worries about the strength of its US alliance guarantees as a result of the US's problems in Vietnam and regional reductions in the US military presence under the Nixon Doctrine.[212] ROK President Park Chung Hee reportedly decided in 1970 to begin a nuclear weapons program, including the creation of a "Weapons Exploitation Committee," after US President Richard Nixon announced the withdrawal of 26,000 American troops from the ROK.[213] Park is said to have decided to pursue a plutonium bomb, and in 1973 the ROK sought to acquire a reprocessing facility from France and a research reactor and heavy water reactor from Canada to produce bomb-grade plutonium.[214]

Seoul's weapons program ran into difficulties, however, when some of its supply arrangements fell through amidst international concern over India's 1974 nuclear test—which, inconveniently for Seoul, was just the sort of misappropriation of dual-use plutonium technology that the ROK hoped to achieve for itself.[215] US officials soon threatened to cancel US alliance guarantees if Seoul continued its weapons program and pressured France into not delivering the reprocessing facility, which effectively ended the ROK's attempt to develop nuclear weapons.[216] Soon thereafter, the ROK ratified the (NPT) on 23 April 1975 under pressure from the United States. And although President Park said in 1977 that Seoul would not develop nuclear weapons so long

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[210] "Nuclear Power in South Korea," World Nuclear Association, http://www.world-nuclear.org/info/inf81.html.
[211] "Nuclear Power in South Korea," World Nuclear Association, http://www.world-nuclear.org/info/inf81.html.
[212] Dr, Christopher A Ford, "Challenges of North Korean Nuclear Negotiation," *DPRK-US Dialogue,* Aspen Policy Program (2011).
[213] Globalsecurity.org, "South Korea Special Weapons," http://www.globalsecurity.org/wmd/world/rok/index.html.
[214] Daniel Pinkston, "South Korea's Nuclear Experiments," *CNS* (9 Nov 2004).
[215] Dr, Christopher A Ford, "Challenges of North Korean Nuclear Negotiation," *DPRK-US Dialogue,* Aspen Policy Program (2011).
[216] Globalsecurity.org, "South Korea Special Weapons," http://www.globalsecurity.org/wmd/world/rok/index.html.

as the US nuclear umbrella continued to cover Seoul against Soviet and DPRK aggression, it is believed he continued a clandestine program that only ended with his assassination in October 1979.[217]

Despite US security assurances and Park's assassination in October 1979, ROK nuclear activities continued. The Korea Atomic Energy Research Institute (KAERI) contracted with the Youngnam Chemical Corporation to import phosphate compounds with a high-level of uranium in the early 1980s. KAERI specifically selected phosphate rock with high uranium content for extraction and conversion, and between 1981 and 1984, yellow cake (U3O8) was converted to uranium oxide (UO2), which was used to produce fuel rods for the Wŏlsŏng-1 Nuclear Power Reactor in 1985.[218]

Reprocessing and Enrichment Activities

Seoul does not seem to have not re-started its program, but it continued to conduct nuclear-related experiments in the 90s primarily dealing with reprocessing and uranium enrichment. ROK scientists conducted a series of laboratory scale experiments up to the year 2000, all without properly declaring them to the IAEA.

Once the IAEA discovered these experiments, Seoul cooperated with the IAEA, and no evidence emerged that its work had formed part of a possible nuclear weapons program, that the program had been continued since the 1970s, or that anything more than basic research was involved.[219] According to interviews of US diplomats conducted in 2004 by the *Washington Post*, during these experiments, ROK scientists enriched uranium to levels four times higher than did their counterparts in Iran (as of 2004).[220]

Further information on the ROK's nuclear efforts was brought to light in August 2004 when the ROK's Ministry of Science and Technology (MOST), as part of its commitments under the Additional Protocol (INFCIRC/540), reported to the IAEA that South Korea had conducted experiments to enrich uranium, extract plutonium, and had produced uranium metal.[221] The Laboratory for Quantum Optics at KAERI conducted experiments to enrich uranium three times during January and February 2000.[222] The experiments yielded about 0.2 grams of uranium enriched to an average of 10 percent in the three experiments, with the peak level of enrichment in the experiments reaching 77 percent.[223]

The ROK is strongly interested in developing an indigenous, plutonium fuel cycle for its civilian

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[217] Globalsecurity.org, "South Korea Special Weapons," http://www.globalsecurity.org/wmd/world/rok/index.html.
[218] Confidential documents and interviews; Mark Hibbs, "KAERI Report Documents Production of 200 Kilograms UF4, DU Imports," *Nucleonics Week*, Vol. 45, No. 44 (28 October 2004) 15-16.
[219] Paul Kerr, "IAEA: Seoul's Nuclear Sins Past," *Arms Control Today* (December 2004).
[220] Dafna Linzer, "S. Korea Nuclear Project Detailed," *The Washington Post* (12 Sept 2004), A24.
[221] Daniel Pinkston, "South Korea's Nuclear Experiments," *CNS* (9 Nov 2004)
[222] Mark Hibbs, "77% U-235 Was Peak Enrichment Reported to IAEA by South Korea," *NuclearFuel*, Vol. 29, No. 30 (27 September 2004) 7-8.
[223] "South Korea's KAERI Quantum Optics Lab Used Dye Lasers to Separate U-235," *Nucleonics Week*, Vol. 45 No. 37, (9 Sept2004) p. 1.

power program, and has been negotiating with the IAEA and the US Department of Energy over safeguards for a "partially constructed, pilot pyroprocessing facility" that it wishes to complete by 2012, with a semi-commercial facility in place by 2025.[224] While ROK officials have claimed this facility, like other past experiments in fuel processing, is the result of "scientific curiosity" or part of plans to localize the production of nuclear fuel, these actions do have applications for weapons development, and there are still questions about past activities that appear to have more direct weapons applications.[225]

The experiments into plutonium extraction and uranium enrichment were technically violations of Seoul's NPT safeguards (INFCIRC/236) commitments that had been in effect since 1975, as well as a violation of the 1992 North and South Korean "Joint Declaration on the Denuclearization of the Korean Peninsula," but it is important to note that they were not part of a robust program to develop nuclear weapons. As David Pinkston has observed, while the experiments "provided data and experience that could be applied to a bomb program or to a peaceful nuclear fuel cycle that could later be part of a 'virtual bomb program' under certain contingencies, […] the experiments were insignificant in terms of bomb production."[226] However, past and current experiments, along with the recent ROK development of long-range land-attack cruise missiles[227] and pursuit of a space-launch capability (see ROK Missile section for more additional information),[228] will not help alleviate suspicions in Pyongyang or the region and they make it more difficult for diplomats working to achieve a non-nuclear Korean peninsula.

ROK Missile Developments

For the last thirty years, the United States has discouraged South Korea from developing long range ballistic and cruise missiles. In a 1979 memorandum of understanding with the United States, which was reiterated in 1990, South Korea voluntarily pledged not to develop ballistic missiles with ranges exceeding 180 kilometers in return for technical assistance from the US. However, since late 1995, Seoul has sought to abrogate that limit.[229]

Recently, the ROK has deployed a series of cruise missiles, the max range of which is 1500km—capable of reaching as far as Beijing and Tokyo, as well as hitting key targets in the entire North Korean territory. In addition to their cruise missile program, the ROK has successfully launched a series of communication satellites in the last decade, meaning that, while they it does not possess a known ballistic missile program, it likely possesses the know how to produce a ballistic missile.

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[224] Miles A Pomper, "Concerns Raised as South Korea Joins GNEP," *Arms Control Today* (Jan/Feb 2008).
[225] Miles A Pomper, "Concerns Raised as South Korea Joins GNEP," *Arms Control Today* (Jan/Feb 2008).
[226] Daniel Pinkston, "South Korea's Nuclear Experiments," *CNS* (9 Nov 2004)
[227] Daniel Pinkston, "South Korean Response to North Korean July Missile Exercise Included Unveiling of New Cruise Missile," *WMD Insights,* (October 2006).
[228] Choe Sang-Hum, "South Korea Launches Satellite," *New York Times* (25 Aug 2009).
[229] Wade Boese, "US and South Korea Hold Ballistic Missile Talks," *Arms Control Agency* (Nov 1999).

The Early Program – The NHK Program

South Korea has made attempts to develop and expand its offensive ballistic missile capabilities since the 1970s. In December 1971, ROK President Park Chung Hee issued a directive to develop a short-range ballistic missile aimed at countering the ballistic missile threat from North Korea. In 1975 the ROK successfully reverse-engineered the US Nike Hercules surface-to-air (SAM) missile system, a system that could also be used in a surface-to-surface capability.[230] Named the NHK-1 (also known as the *Paekkom-1* and *Hyunmu-1*), it had a range of only 150 km (93 miles).[231] Development of the NHK-1 continued into the late 1970s; however, fearing an arms race with on the Korean Peninsula and in greater East Asia, the US became leery of a ROK missile program.[232] Under pressure from the US, the ROK agreed in 1979 to restrict its missile range to 180 kilometers with a 500kg max payload in return for US technical support for ROK missile systems.[233] Soon thereafter, the ROK developed the NHK-2 in 1983, incorporating improved technology and an extended range of 180 km (112 miles), which could be easily extended to 250 km (155 miles) but at the cost of breaking a US-South Korea 1979 agreement.[234] In 2006 it was reported that the ROK would keep the NHK-2 missile in service until 2010; currently it is not known whether or not the missile has been decommissioned.[235]

The Hyunmu-3 Cruise Missile

Seoul responded to advances in DPRK missile capabilities by notifying Washington in 1995 that it wished to adjust the restrictions agreed to in 1979. After five years of consultations, the US backed the ROK's joining the Missile Technology Control Regime (MTCR) in March 2001, a regime that supersedes the 1979 US-Agreement.[236] The MTCR seeks to limit the risks of proliferation of weapons of mass destruction by controlling exports of goods and technologies that could make a contribution to delivery systems (other than manned aircraft) for such weapons.[237] In this context, the Regime limits the range of rockets and unmanned aerial vehicles with a payload over 500kg to 300 km respectively.[238] The MTCR However does not restrict the development of missile as long as its warhead does not weigh more than 500 kilograms.[239]

Thus, the ROK began focusing on the development of cruise missiles, such as the *Hyunmu-3* series, capable of delivering payloads below 500kg to targets deep within the DPRK and beyond. Developed indigenously in the ROK, the *Hyunmu-3* system is reportedly similar in structure and guidance technology to the US Tomahawk, but with a shorter range. It uses an inertial navigation

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[230] Joseph S. Bermudez Jr., "A History of Ballistic Missile Development in the DPRK," CNS Occasional Paper (9 February 2000).
[231] "NHK 1/2," *Missiles of the World,* MissileThreat.com.
[232] Jenny Shin, "The Concern with South Korea's Missile Defense System," *Center for Defense Information* (25 Aug 2009).
[233] Joseph S. Bermudez Jr., "A History of Ballistic Missile Development in the DPRK," CNS Occasional Paper (9 February 2000).
[234] "NHK 1/2," *Missiles of the World,* MissileThreat.com.
[235] "NHK 1/2," *Missiles of the World,* MissileThreat.com.
[236] "MTCR Partners," *The Missile Technology Control Regime,* www.mtcr.info.
[237] "Frequently Asked Questions," *The Missile Technology Control Regime,* http://www.mtcr.info.
[238] "Frequently Asked Questions," *The Missile Technology Control Regime,* http://www.mtcr.info.
[239] "S.Korea develops long-range cruise missile: report," *AFP* (16 July 2010) http://www.google.com/hostednews/afp/article/ALeqM5jIekp13qY7Lz42Ywl7EQr0ufxWaA.

system and technology that matches map images in its computer memory to the features on the ground below it, giving the missile the ability to hit within three meters of its target at worst.[240]

The *Hyunmu-3A* deployed in 2006 with a range of 500 kilometers and is capable of striking Pyongyang but not the DPRK's long-range missile sites, including the Musudan-ri site in North Hamgyeong Province, located more than 300 kilometers from Seoul.[241] In early 2009, the ROK deployed the *Hyunmu-3B*, an improvement of the 3A model, which has a range of 1000km capable of reaching as far as Beijing and Tokyo, as well as hitting key targets throughout the DPRK.[242] But probably the most advanced missile in the ROK arsenal is the *Hyunmu-3C,* which has supposedly just entered into the production phase. In July 2010, AFP reported that the ROK had begun manufacturing *Hyunmu-3C* with a range of up to 1500 km (937 miles) capable of reaching parts of China, Japan and Russia.[243] If these reports are true, the successful indigenous development of a long-range cruise missile would put the ROK in the company of only the United States, Russia and Israel, as countries that have developed cruise missiles with ranges of more than 1500 kilometers.[244] Shin In-kyun, a military expert who heads the Korea Defense Network told *The Korea Herald* that the missile with a 450 kg warhead "measures 6 meters in length and 53-60 centimeters in diameter and weighs 1.5 tons. It can hit targets in all nuclear facilities and major missile bases in the DPRK with high precision (a margin of error of less than 2 meters.)"[245]

However, the development of the long range, highly accurate *Hyunmu-3* may not have a great effect on the force balance on the peninsula. According to Oliver Bloom of CSIS,

> The South Korean cruise missile development certainly won't fundamentally alter the military balance on the Korean Peninsula, nor will it give the South Koreans an incentive to launch a preventive strike (especially given the number of North Korean missiles and chemical weapons aimed at the Seoul), but the new missile certainly may give South Korea another tool in its box in handling North Korean contingencies. If the situation on the peninsula deteriorated to open conflict, South Korea would have an independent means of accurately striking distant North Korean targets without risking aircraft. What's more, the accurate cruise missiles would give South Korea a means to preempt an imminent North Korean attack, were such a thing to develop.[246]

ROK Space Programs

The ROK's potential ballistic capabilities are, however, clear from its successful and expanding space program. In the 1990s, Seoul began development of its own space program, including the

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[240] Kim Min-seok, "Seoul has longer-range cruise missile," *JoongAng Daily* (20 Sept 2006).
[241] Jung Sung-ki, "S. Korea Deploying 1,000-Kilometer Cruise Missiles," *The Korea Times* (17 Aug 2009).
[242] Jung Sung-ki, "S. Korea Deploying 1,000-Kilometer Cruise Missiles," *The Korea Times* (17 Aug 2009).
[243] "S.Korea develops long-range cruise missile: report," *AFP* (16 July 2010) http://www.google.com/hostednews/afp/article/ALeqM5jIekp13qY7Lz42Ywl7EQr0ufxWaA.
[244] Oliver Bloom, "South Korea Develops New Long-range Cruise Missile," *CSIS* (19 July 2009) http://csis.org/blog/south-korea-develops-new-long-range-cruise-missile.
[245] Song Sang-ho, "Seoul gets long-range cruise missile: sources," *The Korea Herald* (18 July 2010).
[246] Oliver Bloom, "South Korea Develops New Long-range Cruise Missile," *CSIS* (19 July 2009) http://csis.org/blog/south-korea-develops-new-long-range-cruise-missile.

development of a space-launch vehicle (SLV). After numerous delays, the ROK launched the two-stage KSLV-1 rocket on 25 August 2009. The launch was intended to place an earth and atmospheric monitoring satellite—the Science and Technology Satellite-2 (STSTAT-2)—into orbit, but after a successful launch, the satellite failed to successfully re-enter the atmosphere.[247] Yet the partial success of this launch raised concerns that South Korea had sufficient technology for a long-range ballistic missile system that could deliver WMD payloads, especially given that the US and ROK are now discussing changing the guidelines that would allow missiles with a range of no more than 497 miles, a distance that would allow the weapons to strike anywhere in North Korea.[248] Should the ROKs missile range increase, it is possible that the ROK may couple their space program with a ballistic missile program to counter the DPRK threat apparent in its *Nodong*, *Musudan*, and *Taepodong* missile programs.

ROK's Chemical and Biological Developments

The ROK has the technology base to create advanced chemical and biological weapons. It has conducted research on defense in both areas, and much of such research is indistinguishable from research on weapons. There are no meaningful indicators, however, the ROK now has, or is now seeking, stockpiles of such weapons.

Chemical

The ROK signed the CWC in 1993, ratified it in April 1997, and began destroying its CW stocks in 1999, completing the destruction of its stockpile in July 2008 after having been granted an extension beyond the previous deadline of December 2007.[249] The South's destruction of its CW stocks has gone mostly unnoticed because Seoul has a confidentiality agreement with the Organization for the Prohibition of Chemical Weapons (OPCW), and neither confirms nor denies the existence of its abandoned CW program.[250] The issue is sensitive in the ROK, and the government is divided. Diplomats in the foreign and trade ministry generally favor disclosure, but the defense ministry prefers ambiguity because of the supposed residual deterrent effect on Pyongyang.[251]

Upon its ratification of the CWC, the ROK—according to many reliable sources—declared possession of several thousand metric tons of chemical warfare agents and one chemical weapons production facility to the OPCW.[252] Paul Walker, security and sustainability chief at Global Green USA said that discussions with informed sources and his own research indicate that the ROK probably held between 3,000 and 3,500 metric tons of chemical warfare material,

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[247] Kim Tong-hyung, "Satellite Fails to Enter Orbit," *Korea Times* (25 August 2009).
[248] "South Korea Seen Changing Missile Range Guidelines," *Global Security Newswire* (14 March 2011).
[249] "North Korea's Chemical and Biological Weapons Programs," *International Crisis Group*, Asia Report No. 167 (18 June 2009) 3-4.
[250] North Korea's Chemical and Biological Weapons Programs," *International Crisis Group*, Asia Report No. 167 (18 June 2009) 4.
[251] North Korea's Chemical and Biological Weapons Programs," *International Crisis Group*, Asia Report No. 167 (18 June 2009) 4.
[252] Nuclear Threat Initiative, "South Korea Profile," http://www.nti.org/e_research/profiles/SKorea/index.html

likely including 400 to 1,000 metric tons of sarin nerve agent contained in artillery shells.[253] The rest could have been binary agents that would have become dangerous when mixed together.[254]

Biological

The ROK ratified the Biological and Toxin Weapons Convention (BTWC) in June 1987, and while the country possesses a well-developed pharmaceutical and biotech infrastructure—the ROK was the 12th largest pharmaceutical market in the world in 2005 valued at USD 7.7 billion—which could serve as the basis for a biological weapons program, there is no evidence that Seoul has an offensive biological weapons (BW) program.[255] Citing a biological threat from North Korea, the ROK conducts defensive BW research and development, including the development of vaccines against anthrax and smallpox.[256]

[253] Chris Schneidmiller, "South Korea Completes Chemical Weapons Disposal," *Global Security Newswire* (17 Oct 2008).
[254] Chris Schneidmiller, "South Korea Completes Chemical Weapons Disposal," *Global Security Newswire* (17 Oct 2008).
[255] "South Korea Biological and Toxin Weapons," *GlobalSecurity.org*, http://www.globalsecurity.org/wmd/world/rok/bw.htm.
[256] "2006 Defense White Paper," Republic of Korea Ministry of National Defense, 26.

Section 7: The Broader Balance of WMD, Missile, and Strategic Forces

There is no way to assess the exact probability that the US or China would use nuclear weapons in a Korean conflict, but they obviously have a major deterrent impact. Unclassified estimates of these forces are shown in the following figures:

- **Figure 7.1 compares the overall strength of US and Major Asian nuclear powers.**
- **Figure 7.2 lists the strength of long-range Chinese missile forces.**

The US and China are major nuclear powers, with boosted and thermonuclear weapons. While neither is likely to use nuclear weapons, they have that capability, and – at a minimum – their possession of nuclear weapons plays a major role in the balance of deterrence and in shaping the risks of asymmetric escalation.

China is also in the process of a major modernization of its nuclear-armed missile forces and is developing a "stealth" strike aircraft—the J-20. It is also now MIRV'ing its nuclear systems. China rarely describes its nuclear forces in detail, but its 2008 defense white paper notes that,[257]

> The Second Artillery Force is a strategic force under the direct command and control of the CMC, and the core force of China for strategic deterrence. It is mainly responsible for deterring other countries from using nuclear weapons against China, and for conducting nuclear counterattacks and precision strikes with conventional missiles.
>
> The Second Artillery Force sticks to China's policy of no first use of nuclear weapons, implements a self-defensive nuclear strategy, strictly follows the orders of the CMC, and takes it as its fundamental mission the protection of China from any nuclear attack. In peacetime the nuclear missile weapons of the Second Artillery Force are not aimed at any country. But if China comes under a nuclear threat, the nuclear missile force of the Second Artillery Force will go into a state of alert, and get ready for a nuclear counterattack to deter the enemy from using nuclear weapons against China. If China comes under a nuclear attack, the nuclear missile force of the Second Artillery Force will use nuclear missiles to launch a resolute counterattack against the enemy either independently or together with the nuclear forces of other services. The conventional missile force of the Second Artillery Force is charged mainly with the task of conducting medium- and long-range precision strikes against key strategic and operational targets of the enemy.
>
> China holds that all nuclear-weapon states should make an unequivocal commitment to the thorough destruction of nuclear weapons, undertake to stop research into and development of new types of nuclear weapons, and reduce the role of nuclear weapons in their national security policy. The two countries possessing the largest nuclear arsenals bear special and primary responsibility for nuclear disarmament. They should earnestly comply with the relevant agreements already concluded, and further drastically reduce their nuclear arsenals in a verifiable and irreversible manner, so as to create the necessary conditions for the participation of other nuclear-weapon states in the process of nuclear disarmament.
>
> China supports the early entry into force of the Comprehensive Nuclear Test-Ban Treaty, and will continue to honor its moratorium commitment on nuclear testing. China supports the preparatory work for the entry into force of the Treaty by the Preparatory Commission of the Comprehensive Nuclear Test-Ban Treaty Organization, and has contributed to the establishment of the International Monitoring System (IMS).

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[257] *China's National Defense in 2008*.Chinese State Council Information Office, http://www.china.org.cn/government/central_government/2009-01/20/content_17155577_9.htm.

> China has always stayed true to its commitments that it will not be the first to use nuclear weapons at any time and in any circumstances, and will unconditionally not use or threaten to use nuclear weapons against non-nuclear-weapon states or in nuclear-weapon-free zones. China calls upon other nuclear-weapon states to make the same commitments and conclude an international legal instrument in this regard. China has already signed all relevant protocols which have been opened for signature of various nuclear-weapon-free zone treaties, and has reached agreement with the ASEAN on relevant issues of the Protocol of the Treaty on the Southeast Asia Nuclear-Weapon-Free Zone. China welcomes the Treaty on a Nuclear-Weapon-Free Zone in Central Asia signed by the five Central Asian countries.

As might be expected, the US has a different perspective. The US national military strategy calls for engagement. The US national military strategy for 2011 does not mention China's role in the Korean balance and Northeast Asia and describes the US strategy for China as follows:[258]

> …Our Nation seeks a positive, cooperative, and comprehensive relationship with China that welcomes it to take on a responsible leadership role. To support this, the Joint Force seeks a deeper military-to-military relationship with China to expand areas of mutual interest and benefit, improve understanding, reduce misperception, and prevent miscalculation. We will promote common interests through China's cooperation in countering piracy and proliferation of WMD, and using its influence with North Korea to preserve stability on the Korean peninsula.
>
> We will continue to monitor carefully China's military developments and the implications those developments have on the military balance in the Taiwan Strait. We remain concerned about the extent and strategic intent of China's military modernization, and its assertiveness in space, cyberspace, in the Yellow Sea, East China Sea, and South China Sea. To safeguard US and partner nation interests, we will be prepared to demonstrate the will and commit the resources needed to oppose any nation's actions that jeopardize access to and use of the global commons and cyberspace, or that threaten the security of our allies.

The US assessment of China's military capabilities does focus on China's growing nuclear and missile forces, and increasing capability to target the US and Japan, in ways that directly affect the Korean balance and the potential risk of US and Japanese involvement in a Korean crisis or conflict. The Department of Defense report on *Military and Security Developments Affecting the People's Republic of China* for 2010 states that,[259]

> China has the most active land-based ballistic and cruise missile program in the world. It is developing and testing several new classes and variants of offensive missiles, forming additional missile units, qualitatively upgrading certain missile systems, and developing methods to counter ballistic missile defenses.
>
> The PLA is acquiring large numbers of highly accurate cruise missiles, such as the domestically-produced ground-launched DH-10 land-attack cruise missile (LACM); the domestically produced ground- and ship-launched YJ-62 anti-ship cruise missile (ASCM), which is outfitted on the domestically produced LUYANG II-class guided-missile destroyer (DDGs); the Russian SS-N-22/SUNBURN supersonic ASCM, which is outfitted on China's SOVREMENNYY-class DDGs acquired from Russia; and, the Russian SS-N- 27B/SIZZLER supersonic ASCM, which is outfitted on China's Russian-built, KILO- class diesel electric submarines.
>
> By December 2009, the PLA had deployed between 1,050 and 1,150 CSS-6 and CSS-7 short-range ballistic missiles (SRBM) to units opposite Taiwan. It is upgrading the lethality of this force, including by introducing variants of these missiles with improved ranges, accuracies, and payloads.

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[258] Admiral M. G. Mullen, *The National Military Strategy of the United States of America, 2011*, Chairman of the Joint Chiefs of Staff (February 8, 2011) 13-14, http://www.defense.gov/pubs/.

[259] *Military and Security Developments Involving the People's Republic of China 2010*, Office of the Secretary of Defense, Annual Report to Congress (August 2010) http://www.defense.gov/pubs/.

China is developing an anti-ship ballistic missile (ASBM) based on a variant of the CSS-5 medium-range ballistic missile (MRBM). The missile has a range in excess of 1,500 km, is armed with a maneuverable warhead, and when integrated with appropriate command and control systems, is intended to provide the PLA the capability to attack ships, including aircraft carriers, in the western Pacific Ocean.

China is modernizing its nuclear forces by adding more survivable delivery systems. For example, in recent years the road mobile, solid propellant DF-31 and DF-31A intercontinental range ballistic missiles (ICBM) have entered service. The DF-31A, with a range in excess of 11,200 km, can reach most locations within the continental United States (CONUS). China may also be developing a new road- mobile ICBM, possibly capable of carrying a multiple independently targeted re-entry vehicles (MIRV).

… China is both qualitatively and quantitatively improving its strategic missile forces. China's nuclear arsenal currently consists of approximately 20 silo- based, liquid-fueled CSS-4 ICBMs; approximately 30 solid-fueled, road-mobile DF- 31 and DF-31A ICBMs; approximately 20 liquid-fueled, limited-range CSS-3 ICBMs; between 15 to 20 liquid-fueled CSS-2 intermediate-range ballistic missiles; CSS-5 road-mobile, solid-fueled MRBMs (for regional deterrence missions); and JL-1 submarine- launched ballistic missiles (SLBM) for the XIA-class SSBN, although the operational status of the XIA-class SSBN/JL-1 combination remains questionable.

…By 2015, China's nuclear forces will include additional DF-31 and DF-31As, and enhanced CSS-4s, CSS-3s, and CSS-5s. The first of the new JIN-class (Type 094) SSBN appears ready, but the associated JL-2 SLBM appears to have encountered difficulty, failing several of what should have been the final round of flight tests. The date when the JIN-class SSBN/JL-2 SLBM combination will be operational is uncertain. China is also currently working on a range of technologies to attempt to counter US and other militaries' ballistic missile defense systems, including maneuvering re-entry vehicles, MIRVs, decoys, chaff, jamming, thermal shielding, and anti-satellite (ASAT) weapons. PRC official media also cites numerous Second Artillery Corps training exercises featuring maneuver, camouflage, and launch operations under simulated combat conditions, which are intended to increase survivability. Together with the increased mobility and survivability of the new generation of missiles, these technologies and training enhancements strengthen China's nuclear deterrent and enhance its strategic strike capabilities.

The introduction of more mobile systems will create new command and control challenges for China's leadership, which now confronts a different set of variables related to deployment and release authorities. For example, the PLA has only a limited capacity to communicate with submarines at sea, and the PLA Navy has no experience in managing a SSBN fleet that performs strategic patrols with live nuclear warheads mated to missiles. Land-based mobile missiles may face similar command and control challenges in wartime, although probably not as extreme as with submarines.

Beijing's official policy towards nuclear deterrence continues to focus on maintaining a nuclear force structure able to survive enemy attack and respond with sufficient strength to inflict unacceptable damage on the enemy. The new generation of mobile missiles, maneuvering and MIRV warheads, and penetration aids are intended to ensure the viability of China's strategic deterrent in the face of continued advances in US and, to a lesser extent, Russian strategic intelligence, surveillance, and reconnaissance; precision strike; and missile defense capabilities.

Beijing has consistently asserted that it adheres to a "no first use" (NFU) policy, stating it would use nuclear forces only in response to a nuclear strike against China. China's NFU pledge consists of two parts—China will never use nuclear weapons first against any nuclear-weapon state and China will never use or threaten to use nuclear weapons against any non-nuclear-weapon state or nuclear-weapon- free zone. However, there is some ambiguity over the conditions under which China's NFU policy would or would not apply, including for example, whether strikes on what China considers its own territory, demonstration strikes, or high altitude bursts would constitute a first use. Moreover, some PLA officers have written publicly of the need to spell out conditions under which China might need to use nuclear weapons—for example, if an enemy's conventional attack threatened the survival of China's nuclear force, or of the regime itself. However, there has been no indication that national leaders are willing to attach such nuances and caveats to China's "no first use" doctrine.

As has been discussed earlier, however, strategic nuclear weapons and missile programs are only part of a far wider range of important issues in assessing the Korean balance:

- The DPRK has implosion fission weapons. Its numbers, weapons yields, and ability to create reliable bombs and missile warheads is uncertain, but it seems likely it either has them or is rapidly moving towards acquiring them. It almost certainly has programs to develop boosted and thermonuclear weapons, but there status is unknown.
- The ROK had a covert nuclear weapons program that it halted after quiet negotiations with the US. This gives ROK it a significant nuclear breakout capability if it should reverse its decisions.
- Japan is unlikely to have nuclear weapons programs, but has all of the technology and material necessary to rapidly acquire them and develop boosted and thermonuclear weapons.
- The US and China have nuclear-armed aircraft and ICBMs, IRBMs. MRBMs, and SRBMs with boosted and thermonuclear weapons. The DPRK may have long-range tactical and theater missiles with implosion nuclear weapons.
- The DPRK is a major chemical weapons state, and probably has advanced chemical warheads and bombs. China may have stocks of chemical weapons. There is no way to estimate the size, type, and lethality/effectiveness of their relative stockpiles, or doctrine and plans for using them. It should be noted, however, that relatively crude mustard gas weapons played a decisive role in area denial and disruption of Iranian forces in the final phase of the Iran-Iraq War in 1988, and that stocks of persistent nerve gas and so-called 4th generation chemical weapons are possible. The ROK is suspected to have a chemical weapons program, and may have covert stocks of chemical weapons.
- The DPRK is strongly suspected to have a biological weapons program and may have stocks of such weapons. These could range from basic weapons types to genetically modified types. China's program is not discussed in unclassified official statements. The ROK may have a program. It should be noted that China, Japan, the DPRK, the ROK, and the US all have advanced civil biological, food processing, chemical processing, and pharmaceutical facilities that can be adapted to both chemical and biological weapons development and production. All have significant capability for genetic engineering of biological weapons. All would have to develop advanced biological weapons for test purposes to conduct an effective biological defense program.
- No public details are available on the efforts of any power to develop small or specialized chemical, biological, radiological, or nuclear weapons for covert delivery or potential transfer to non-state actors and third countries.
- China and the DPRK have large numbers of conventionally armed long-range missiles capable of hitting targets in the ROK. The nature of their conventional warheads is not clear, and this is critical since unity conventional warheads have limited lethality, and terminal guidance is needed to provide the accuracy necessary to strike at high value, rather than broad area targets. China and the DPRK may have, and are certainly developing, ballistic and cruise missiles with some form of terminal guidance.
- The US has large numbers of precision-guided long range cruise missiles for air and sea launch, and precision-guided long-range multiple rocket launchers. US stealth aircraft can deliver precision guided weapons at stand-off ranges from most Chinese and DPRK surface-to-air missiles with the exception of the S300/S400 series. China is developing long-range anti-ship ballistic missiles that can strike large surface ships like US carriers at long distances. These potentially are "weapons of mass effectiveness" that can launch devastating strikes against critical facilities and infrastructure without the use of WMD warheads.
- The US, Japan, and the ROK have some ballistic missile defense capability and are working together to develop wide area theater ballistic missile defense systems. China has the Russian S300/S400 series of advanced surface-to-air missile defenses, and is almost certainly seeking more advanced missile defense capabilities. The DPRK lacks such capabilities, but is almost certainly seeking them. The balance of air and missile defense capabilities plays a critical role in limiting the offensive capabilities of the opposite side and reducing the risk in using one's own missiles. This makes air and missile defenses the equivalent of a major offensive weapon.

- China, the US, the ROK, and possibly the DPRK, all have advanced cyberwarfare capabilities. China has some anti-satellite capability, and possibly some form of EMP weapon. These too are potential "weapons of mass effectiveness" that can launch devastating strikes against critical facilities and infrastructure without the use of WMD warheads.

Current arms control efforts and assessments of the Korean balance tend to focus on the DPRK's nuclear programs, but this list shows such programs are only part of a far more complex and rapidly evolving mix of current and potential capabilities to deliver weapons of mass destruction or mass effectiveness. The threat such weapons may be used also cannot be limited to the Korean peninsula. It already extends to Japan and US bases in Japan. US reaction again raises the issue of what China's response would be and whether a crisis could escalate to the point where the US-Chinese strategic and nuclear balance became relevant – a threat that could force Japan to make hard choices of its own.

The range of uncertainties on this list also raises two key issues for arms control:

- **One is the so-called "Nth weapon paradox."** It may be possible to reduce a nation's nuclear weapons, but it is probably impossible to be certain it does not retain at least a few. The problem for arms control is that the smaller the stockpile, the more it has to be used in ways that threaten absolutely critical targets like major population centers rather than a given military target. Arms reductions can easily escalate targeting.
- **The second is the "diversion effect:"** The risk that nuclear controls can drive states even more towards advanced biological and chemical weapons. Advances in biotechnology have made control regimes virtually impossible, as well as vastly increase the potential lethality of biological weapons to levels beyond that of even boosted and thermonuclear weapons.

It is also clear from this list that the nuclear threat already is only part of the equation. The DPRK has long been a chemical weapons power. It is believed to have active biological weapons programs, and it clear has long-range missile programs that can target Japan and any target in ROK. These can potentially be armed with a range of CBRN warheads – but no meaningful unclassified evidence exists of the range of such warheads or their lethality. The same is true of DPRK bombs, and rocket warheads. This means that CBRN escalation could occur at a wide range of unpredictable levels – including asymmetric, covert, and terrorist attacks. Moreover, the DPRK is already acquiring missile engines and boosters that will give it ICBM capabilities to attack targets in the US

The Balance of Weapons of Mass Effectiveness

It is equally important to stress that advanced forms of conventionally-armed ballistic and cruise missiles can be used to threaten or attack targets, and do so with strategic effect. It is unclear how accurate the DPRK's missiles are, and it seems doubtful that Pyongyang now has a real-world terminal guidance capability to use conventionally armed ballistic and cruise missiles ballistic missiles effectively against critical point targets. As long as the DPRK does not have such "smart" warheads, conventionally armed missiles are largely terror weapons. Once the DPRK does have them, however, they potentially add "weapons of mass effectiveness" that can destroy high value and critical infrastructure targets with conventional warheads.

The US does have conventionally-armed, precision guided-deep strike SRBMs, however, and both the US and the ROK have strike aircraft and precision-guided air-to-surface weapons that targeting patterns in the Balkans conflict, and both Gulf Wars, show can hit critical infrastructure

targets with strategic effect. This could lead to new patterns of escalation where the US and ROK used precision guided air-to-surface, surface-to-surface, and cruise missiles to destroy equally critical DPRK targets, or threaten to use such weapons to deter Pyongyang. The US also can deliver such weapons with "stealth" strike aircraft and bombers, and Japan and ROK are likely to acquire strike aircraft with some "stealth" capability. Alternatively, the US and ROK might threaten or initiate the use of precision guided air-to-surface, surface-to-surface, and cruise missiles to destroy critical DPRK targets or to halt a DPRK conventional attack.

China and Strategic Asymmetric Warfare

China has steadily attempted to develop new and innovative capabilities for asymmetric warfare that it is expanding to the strategic and grand strategic level. China states that this is not an offensive effort. Its 2008 defense white paper does not address the Koreas *per se*, but notes that,[260]

> China is still confronted with long-term, complicated, and diverse security threats and challenges. Issues of existence security and development security, traditional security threats and non-traditional security threats, and domestic security and international security are interwoven and interactive. China is faced with the superiority of the developed countries in economy, science and technology, as well as military affairs. It also faces strategic maneuvers and containment from the outside while having to face disruption and sabotage by separatist and hostile forces from the inside. Being in a stage of economic and social transition, China is encountering many new circumstances and new issues in maintaining social stability. Separatist forces working for "Taiwan independence," "East Turkistan independence" and "Tibet independence" pose threats to China's unity and security. Damages caused by non-traditional security threats like terrorism, natural disasters, economic insecurity, and information insecurity are on the rise. Impact of uncertainties and destabilizing factors in China's outside security environment on national security and development is growing. In particular, the United States continues to sell arms to Taiwan in violation of the principles established in the three Sino-US joint communiqués, causing serious harm to Sino-US relations as well as peace and stability across the Taiwan Straits.
>
> In the face of unprecedented opportunities and challenges, China will hold high the banner of peace, development and cooperation, persist in taking the road of peaceful development, pursue the opening-up strategy of mutual benefit, and promote the building of a harmonious world with enduring peace and common prosperity; and it will persist in implementing the Scientific Outlook on Development in a bid to achieve integration of development with security, persist in giving due consideration to both traditional and non-traditional security issues, enhancing national strategic capabilities, and perfecting the national emergency management system. At the same time, it will persist in pursuing the new security concept featuring mutual trust, mutual benefit, equality and coordination, and advocating the settlement of international disputes and hotspot issues by peaceful means. It will encourage the advancement of security dialogues and cooperation with other countries, oppose the enlargement of military alliances, and acts of aggression and expansion. China will never seek hegemony or engage in military expansion now or in the future, no matter how developed it becomes.
>
> …The influence of military security factors on international relations is mounting. Driven by competition in overall national strength and the development of science and technology, international military competition is becoming increasingly intense, and the worldwide revolution in military affairs (RMA) is reaching a new stage of development. Some major powers are realigning their security and military strategies, increasing their defense investment, speeding up the transformation of armed forces, and developing advanced military technology, weapons and equipment. Strategic nuclear forces, military astronautics, missile defense systems, and global and battlefield reconnaissance and surveillance have

[260] *China's National Defense in 2008*.Chinese State Council Information Office, http://www.china.org.cn/government/central_government/2009-01/20/content_17155577_9.htm.

become top priorities in their efforts to strengthen armed forces. Some developing countries are also actively seeking to acquire advanced weapons and equipment to increase their military power. All countries are attaching more importance to supporting diplomatic struggles with military means. As a result, arms races in some regions are heating up, posing grave challenges to the international arms control and non-proliferation regime.

…In the face of unprecedented opportunities and challenges, China will hold high the banner of peace, development and cooperation, persist in taking the road of peaceful development, pursue the opening-up strategy of mutual benefit, and promote the building of a harmonious world with enduring peace and common prosperity; and it will persist in implementing the Scientific Outlook on Development in a bid to achieve integration of development with security, persist in giving due consideration to both traditional and non-traditional security issues, enhancing national strategic capabilities, and perfecting the national emergency management system. At the same time, it will persist in pursuing the new security concept featuring mutual trust, mutual benefit, equality and coordination, and advocating the settlement of international disputes and hotspot issues by peaceful means. It will encourage the advancement of security dialogues and cooperation with other countries, oppose the enlargement of military alliances, and acts of aggression and expansion. China will never seek hegemony or engage in military expansion now or in the future, no matter how developed it becomes.

…Taking the road of leapfrog development. Persisting in taking mechanization as the foundation and informationization as focus, China is stepping up the composite development of mechanization and informationization. Persisting in strengthening the military by means of science and technology, China is working to develop new and high-tech weaponry and equipment, carry out the strategic project of training talented people, conduct military training in conditions of informationization, and build a modern logistics system in an all-round way, so as to change the mode of formation of war-fighting capabilities. Persisting in laying stress on priorities, China distinguishes between the primary and the secondary, and refrains from doing certain things, striving to achieve leapfrog development in key areas. China persists in building the armed forces through diligence and thrift, attaching importance to scientific management, in order to make the fullest use of its limited defense resources.

China implements a military strategy of active defense. Strategically, it adheres to the principle of featuring defensive operations, self-defense and striking and getting the better of the enemy only after the enemy has started an attack. In response to the new trends in world military developments and the requirements of the national security and development strategy, China has formulated a military strategic guideline of active defense for the new period.

This guideline aims at winning local wars in conditions of informationization. It takes into overall consideration the evolution of modern warfare and the major security threats facing China, and prepares for defensive operations under the most difficult and complex circumstances. Meeting the requirements of confrontation between war systems in modern warfare and taking integrated joint operations as the basic approach, it is designed to bring the operational strengths of different services and arms into full play, combine offensive operations with defensive operations, give priority to the flexible application of strategies and tactics, seek advantages and avoid disadvantages, and make the best use of our strong points to attack the enemy's weak points. It endeavors to refine the command system for joint operations, the joint training system and the joint support system, optimize the structure and composition of forces, and speed up the building of a combat force structure suitable for winning local wars in conditions of informationization.

This guideline lays stress on deterring crises and wars. It works for close coordination between military struggle and political, diplomatic, economic, cultural and legal endeavors, strives to foster a favorable security environment, and takes the initiative to prevent and defuse crises, and deter conflicts and wars. It strictly adheres to a position of self-defense, exercises prudence in the use of force, seeks to effectively control war situations, and strives to reduce the risks and costs of war. It calls for the building of a lean and effective deterrent force and the flexible use of different means of deterrence. China remains committed to

> the policy of no first use of nuclear weapons, pursues a self-defensive nuclear strategy, and will never enter into a nuclear arms race with any other country.
>
> This guideline focuses on enhancing the capabilities of the armed forces in countering various security threats and accomplishing diversified military tasks. With the focus of attention on performing the historical missions of the armed forces for the new stage in the new century and with raising the capability to win local wars in conditions of informationization at the core, it works to increase the country's capabilities to maintain maritime, space and electromagnetic space security and to carry out the tasks of counter-terrorism, stability maintenance, emergency rescue and international peacekeeping. It takes military operations other than war (MOOTW) as an important form of applying national military forces, and scientifically makes and executes plans for the development of MOOTW capabilities. China participates in international security cooperation, conducts various forms of military exchanges and promotes the establishment of military confidence-building mechanisms in accordance with this guideline.

Chinese military analysts publicly explore a wide range of innovative strategies designed to deter of limit US military capabilities in the region – although most focus on Taiwan. China may already have conventionally armed missiles with terminal guidance systems, and certainly has such systems under development – including ballistic anti-ship missiles that pose a long-range strategic threat to US carrier task forces. As Bonnie S. Glaser, a leading US expert on Chinese military forces, notes: "these strategies are laid out in publications by military academies and scholars on questions of military strategy and doctrine, including multiple editions of *Zhanlue Xue* (The Science of Strategy) and *Zhanyi Xue* (The Science of Campaigns) as well as *Zhanyi Lilun Xuexi Zhinan* (Campaign Theory Study Guide). One volume of the Science of Strategy was translated into English."[261]

The US Department of Defense puts heavy emphasis on these capabilities in its report on *Military and Security Developments Affecting the People's Republic of China* for 2010. It also stresses another aspect of China's evolving strategy that directly affects the Korean military balance. It notes that China is making,[262]

> a sustained effort to develop the capability to attack, at long ranges, military forces that might deploy or operate within the western Pacific, which the Department of Defense characterizes as "anti-access" and "area denial" capabilities, respectively. China is pursuing a variety of air, sea, undersea, space and counterspace, and information warfare systems and operational concepts to achieve this capability, moving toward an array of overlapping, multilayered offensive capabilities extending from China's coast into the western Pacific. China's 2008 Defense White Paper asserts, for example, that one of the priorities for the development of China's armed forces is to "increase the country's capabilities to maintain maritime, space and electromagnetic space security."
>
> An essential element, if not a fundamental prerequisite, of China's emerging anti- access/area-denial regime is the ability to control and dominate the information spectrum in all dimensions of the modern battlespace. PLA authors often cite the need in modern warfare to control information, sometimes termed "information blockade" or "information dominance," and to seize the initiative and gain an information advantage in the early phases of a campaign to achieve air and sea superiority. China is improving information and operational security to protect its own information structures, and is also developing electronic and information warfare capabilities, including denial and deception, to defeat those of its adversaries. China's "information blockade" likely envisions employment of military and non-military instruments of state power across the battlespace, including in cyberspace and outer space. China's investments in advanced electronic warfare systems, counter-space weapons, and computer network

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[261] Bonnie S. Glaser, email of February 8, 2010.

[262] Office of the Secretary of Defense, Annual Report to Congress, *Military and Security Developments Involving the People's Republic of China 2010,* August 2010, http://www.defense.gov/pubs/

> operations— combined with more traditional forms of control historically associated with the PLA and CCP systems, such as propaganda and denial through opacity, reflect the emphasis and priority China's leaders place on building capability for information advantage.
>
> In more traditional domains, China's anti- access/area-denial focus appears oriented toward restricting or controlling access to China's periphery, including the western Pacific. China's current and projected force structure improvements, for example, will provide the PLA with systems that can engage adversary surface ships up to 1,000 nautical miles from the PRC coast. These include:
>
> - Anti-Ship Ballistic Missiles: MRBMs designed to target forces at sea, combined with overhead and over-the-horizon targeting systems to locate and track moving ships.
> - Conventional and nuclear-powered attack submarines: KILO, SONG, YUAN, and SHANG attack submarines capable of firing advanced ASCMs.
> - Surface Combatants: SOVREMENNYY-II, destroyers with advanced long-range anti- air and anti-ship missiles.
> - Maritime Strike Aircraft: FB-7 and FB-7A and the SU-30 MK2, armed with ASCMs to engage surface combatants.
>
> Similarly, current and projected systems will allow the PLA to strike regional air bases, logistical facilities, and other ground-based infrastructure. PRC military analysts have concluded that logistics and power projection are potential vulnerabilities in modern warfare, given the requirements for precision in coordinating transportation, communications, and logistics networks. China is fielding an array of conventionally armed ballistic missiles, ground- and air-launched land-attack cruise missiles, special operations forces, and cyber- warfare capabilities to hold targets at risk throughout the region.

It became clear in early 2011 that China is developing its own "stealth" strike fighter – the J-20, although its capabilities and deployment schedule remain unknown.[263] James R. Clapper, the US Director of National Intelligence, described the US assessment of this development as follows in his testimony to the US Intelligence Community for the House Permanent Select Committee on Intelligence on February 10, 2011:

> China's ongoing military modernization program began in earnest in the late 1990s, after Beijing observed the threat posed by long-range precision guided warfare in DESERT STORM and the Balkans. China's defense policies—initially aimed at creating credible options to forcibly bring Taiwan under Beijing's authority and developing the corresponding capabilities to prevent US intervention in a cross-Strait conflict—led Beijing to invest heavily in short- and medium-range ballistic missiles, modern naval platforms, improved air and air defense systems, counterspace capabilities, and an Intelligence, Surveillance, and Reconnaissance (ISR) system. For example, the Chinese have recently conducted the first flight test of what we refer to as a fifth-generation fighter, the J-20. We have known about this program for a long time and the flight test was not a surprise. We judge that this event is another indication of China's aspiration to develop a world-class military, and it is a capability we take seriously. But this program, like others in China, will have to overcome a number of hurdles before reaching its full potential.

Moreover, cyber-warfare is becoming steadily more critical, and affects civil operations as well as warfighting. China is a leading state in developing such capabilities. It is important to note that the ROK is probably even more dependent on the Internet than any other nation in the world. Moreover. China has tested anti-satellite weapons that could also have a massive impact on US battle management and IS&R systems, and may have some capability to use EMP weapons.

[263] Bill Sweetman, "Chinese J-20 Stealth Fighter In Taxi Tests *Aviation Week*" (3 Jan 2011) www.aviationweek.com.

The US and Extended Regional Deterrence

These same shifts in the wider military balance affecting the Koreas help explain the fact that the US simultaneously is seeking arms control and examining developments for a new approach to regional extended deterrence as an alternative approach to enhancing regional stability. As the US Nuclear Posture document issued in 2010 makes clear, this could involve further major changes in the military balance:[264]

> The United States is committed to the long-term goal of a world free of nuclear weapons. The President has directed a review of potential future reductions in US nuclear weapons below New START levels. Several factors will influence the magnitude and pace of such reductions.
>
> …any future nuclear reductions must continue to strengthen deterrence of potential regional adversaries, strategic stability vis-à-vis Russia and China, and assurance of our allies and partners.
>
> This will require an updated assessment of deterrence requirements; further improvements in US, allied, and partner non-nuclear capabilities; focused reductions in strategic and non- strategic weapons; and close consultations with allies and partners. The United States will continue to ensure that, in the calculations of any potential opponent, the perceived gains of attacking the United States or its allies and partners would be far outweighed by the unacceptable costs of the response.
>
> …Accordingly, the United States is fully committed to strengthening bilateral and regional security ties and working closely with its allies and partners to adapt these relationships to emerging 21st century requirements. We will continue to assure our allies and partners of our commitment to their security and to demonstrate this commitment not only through words, but also through deeds. This includes the continued forward deployment of US forces in key regions, strengthening of US and allied non-nuclear capabilities, and the continued provision of extended deterrence. Such security relationships are critical not only in deterring potential threats, but can also serve our non-proliferation goals – by demonstrating to neighboring states that their pursuit of nuclear weapons will only undermine their goal of achieving military or political advantages, and by reassuring non-nuclear US allies and partners that their security interests can be protected without their own nuclear deterrent capabilities. Further, the United States will work with allies and partners to strengthen the global non-proliferation regime, especially the implementation of existing commitments within their regions.
>
> Security architectures in key regions will retain a nuclear dimension as long as nuclear threats to US allies and partners remain. US nuclear weapons have played an essential role in extending deterrence to US allies and partners against nuclear attacks or nuclear-backed coercion by states in their region that possess or are seeking nuclear weapons. A credible US "nuclear umbrella" has been provided by a combination of means – the strategic forces of the US Triad, non- strategic nuclear weapons deployed forward in key regions, and US-based nuclear weapons that could be deployed forward quickly to meet regional contingencies.
>
> The mix of deterrence means has varied over time and from region to region…During the Cold War, the United States forward-deployed nuclear weapons in both Europe and Asia, and retained the capability to increase those deployments if needed. At the end of the Cold War, a series of steps were taken to dramatically reduce the forward presence of US nuclear weapons. Today, there are separate choices to be made in partnership with allies in Europe and Asia about what posture best serves our shared interests in deterrence and assurance and in moving toward a world of reduced nuclear dangers.
>
> …In Asia and the Middle East – where there are no multilateral alliance structures analogous to NATO – the United States has mainly extended deterrence through bilateral alliances and security relationships and through its forward military presence and security guarantees. When the Cold War ended, the United States

[264] Department of Defense, *Nuclear Policy Review* (April 2010) 29, 31-32.

> withdrew its forward-deployed nuclear weapons from the Pacific region, including removing nuclear weapons from naval surface vessels and general purpose submarines. Since then, it has relied on its central strategic forces and the capacity to re-deploy non-strategic nuclear systems in East Asia, if needed, in times of crisis.
>
> The Administration is pursuing strategic dialogues with its allies and partners in East Asia and the Middle East to determine how best to cooperatively strengthen regional security architectures to enhance peace and security, and reassure them that US extended deterrence is credible and effective.
>
> Unless dramatic shifts take place to limit the DPRK nuclear and missile efforts, they are almost certain to lead to some new mix of US, Japanese, and ROK efforts to build up radically more effective air and missile defenses, offer at least enhanced conventional deterrence in the form of weapons of mass effectiveness, and possibly include a more structured form of US theater nuclear umbrella.

Barring major new limits to the DPRK's nuclear and missile efforts, these developments are almost certain to lead to some new mix of US, Japanese, and ROK efforts to build up radically more effective air and missile defenses, offer at least enhanced conventional deterrence in the form of weapons of mass effectiveness, and possibly include a more structured form of US theater nuclear umbrella.

The Strategic "Offensive" Character of "Defensive" Weapons

Finally, the fact so many missile and precision air strike systems are being deployed has turned "defensive" weapons such as ballistic missile defense and surface-to-air missile forces into "offensive" forces as well. The comparative ability to defend also equates to the ability to reduce the risk in escalating to offensive missile, air, and stealth attacks.

The data in **Figure 2.2g** have shown US, Japan, and the ROK have a limited advantage in tactical and missile defense capabilities. The US also has a monopoly in strategic missile defenses capabilities but China's deployment of Russian S-300 surface-to-air/tactical missile defense systems is giving it substantial capability for point defense, and China has begun to test a system with theater and strategic defense capabilities. A rough estimate of the systems with some anti-missile capability now in east Asian forces include:

- **Japan:** 100 Mim-23 Patriot, 6 PAC-3 Patriot, Standard sea-based systems
- **ROK**: 48 Patriot
- **China:** 32 S300PMU-1, 64 S300PMU-1 1, 64 S300PMU-1 2

The US and Japan are cooperating in ballistic missile defense. As the *Bulletin of Atomic Scientists* notes,[265]

> …(Japan) has deployed a multilayered missile defense system that consists of sea-based midcourse missile defense (the Aegis ballistic missile defense system); and ground-based terminal phase missile defense (Patriot Advanced Capabilities-3, or PAC-3). With the accelerated process, a PAC-3 installment in the Tokyo Metropolitan area has been completed. By March 2011, PAC-3 missiles will be deployed at 16 fire units around Japan's major cities.
>
> The Aegis system features a three-stage missile (SM-3) with a range of 1,000 kilometers designed to intercept a short- to intermediate-range ballistic missile in outer space. At its first flight test in December 2007, the SM-3 launched from *Kongo*, a Japanese Aegis ship, and detected, tracked, and destroyed a mock missile that resembled North Korea's Nodong outside the atmosphere at an altitude of approximately 100 miles. With its mission

[265] Masako Toki, "Missile defense in Japan," *Bulletin of the Atomic Scientists* (16 Jan 2009) http://www.thebulletin.org/web-edition/features/missile-defense-japan

accomplished, *Kongo* was deployed at Japan's Air Self Defense Force (MSDF) Sasebo base in Nagasaki on January 4, 2008.

Recent exercises also show that the US and Japan are succeeding in developing steadily more integrated approaches to such warfare. For example, the US Missile Defense Agency reported on October 29, 2010 that the Japan Maritime Self-Defense Force (JMSDF) and the United States Missile Defense Agency (MDA) had successfully completed an Aegis Ballistic Missile Defense (BMD) intercept flight test, in cooperation with the US Navy, off the coast of Kauai in Hawaii. The event marked the fourth time that a JMSDF ship has engaged a ballistic missile target, including three successful intercepts, with the sea-based midcourse engagement capability provided by Aegis BMD:

> The JFTM-4 test event verified the newest engagement capability of the Japan Aegis BMD configuration of the recently upgraded Japanese destroyer, JS KIRISHIMA. At approximately 5:06 p.m. (HST), 12:06 p.m. Tokyo time on Oct. 29, 2010, a separating 1,000 km class ballistic missile target was launched from the Pacific Missile Range Facility at Barking Sands, Kauai, Hawaii. JS KIRISHIMA crewmembers detected and tracked the target. The Aegis Weapon System then developed a fire control solution and launched a Standard Missile -3 (SM-3) Block IA missile. Approximately three minutes later, the SM-3 successfully intercepted the target approximately 100 miles above the Pacific Ocean. JFTM-4 is a significant milestone in the growing cooperation between Japan and the US in the area of missile defense. Also participating in the test was USS LAKE ERIE and USS RUSSELL, Aegis ships which cooperated to detect, track and conduct a simulated intercept engagement against the same target.

US and Japanese capabilities are likely to increase sharply in the near-term, as more advanced tactical and long-range, wide-area theater missile defense systems like the Standard SM-2 and S-M3 and THAAD enter service.

The ROK is also rushing to improve its missile defenses, and create a new force to detect and intercept DPRK ballistic missiles, by 2012. According to *Defense News*, this capability is planned to cost a total of 300 billion won ($214 million):[266]

> Seoul plans to buy new radars which can detect objects up to 1,000 kilometers (600 miles) away for the new system, which will put the North's missiles under close watch around the clock, they said…North Korea has short-range Scuds and Rodongs with a range of 1,300 kilometers, while actively developing longer-range Taepodong missiles that could reach the United States.
>
> …Scuds and Rodongs put all of South Korea within range…In recent weeks, Pyongyang has apparently started assembling its longest-range Taepodong-2 missile and it could be ready for launch late this month, according to media reports in Seoul and Washington. The Taepodong-2 could theoretically reach Alaska but blew up after 40 seconds when it was first test-fired in July 2006.
>
> South Korea has warned that any launch would bring the North increased isolation and added sanctions. The United States said it would be provocative…The North has responded furiously to South Korean President Lee Myung-Bak, who took office in February last year and who has linked major economic aid to progress in the communist country's nuclear disarmament.

[266] Defense News, "*South Korea to Complete Missile Defense by 2012*," *Agence France-Presse (*15 Feb, 2011) http://www.defensenews.com/story.php?i=3949088.

> Late last month, the North said it had scrapped all peace accords with the South, including a 1991 agreement that recognized the Yellow Sea border as an interim frontier off the western coast.
>
> …South Korea in 2007 launched its first Aegis destroyer, which was finally deployed for operational use in December 2008…The King Sejong, the $1 billion, 7,600-ton KDX-III destroyer, adopts the US-built Aegis system that allows a ship to combat multiple surface, underwater and aerial threats…. South Korea plans to deploy a second Aegis destroyer and a third for operational use in 2010 and 2012, according to its navy.
>
> Last year, South Korea began taking delivery of US-made Patriot missiles to replace its aging Nike ground-to-air missiles and better cope with North Korean missile threats…Seoul had announced a plan to purchase 48 Patriots by this year, setting 2010 as a target for them to be operational…The United States, which bases 28,500 troops in South Korea, has upgraded its Patriot batteries here with advanced missiles.

China is beginning to produce its own variant of the S300, and may be able to deploy significantly more advanced theater missile defense systems in the mid-term. It also tested a much more advanced missile defense system on January 11, 2010. The test targeted a missile during the mid-course phase when the target was exoatmospheric. The name of the test is called the *Test of the Land-based Mid-course Phase Anti-ballistic Missile Interception Technology*. According to press reports, the US Department of Defense stated that, "We detected two geographically separated missile launch events with an exoatmospheric collision also being observed by space-based sensors."[267]

[267] "China did not notify US before anti-missile test: Pentagon," *AFP*, (12 Jan 2010) Available at http://www.google.com/hostednews/afp/article/ALeqM5gIyJwTWQjzwLtHke9NhVHNS7qiHQ.

Figure 7.1: US and Asian Nuclear Capable forces

United States

Quantity	Role/Type
Navy	
14	Ohio SSBN 730 *Each with up to 24 UGM-133A Trident D-5 strategic SLBM*
Air Force	
6	SQN with 71 B-52H Stratofortress *Each with up to 20 AGM-86B nuclear ALCM and/or AGM-129A nuclear ACM*
2	SQN with 19 B-2A Spirit *Each with up to 16 free-fall bombs (or 80 when fitted with Small Diameter Bombs)*
4	B-52 test heavy BBR
1	B-2 test heavy BBR
9	SQN with 450 LGM-30G Minuteman III *Each with a capacity of 1-3 MIRV Mk12/Mk12A per missile*

Russia

Quantity	Role/Type
Navy	
5	Kalmar (Delta III) *Each with 16 RSM-50 Stingray strategic SLBM*
6	Delfin (Delta IV) *Each with 16 RSM-54 Skiff strategic SLBM*
3	Akula (Typhoon) *Each with 20 RSM-52 Sturgeon strategic SLBM*
Strategic Rocket Force Troops	
3	Rocket Armies *12 divisions with 430 missiles and 1,605 nuclear warheads*
Strategic Missiles	
60	RS-20 Satan (mostly mod 4/5, 10 MIRV per msl)
170	RS12M Sickle
70	RS18 Stiletto (mostly mod 3, 6 MIRV per msl)
52	Topol-M, silo based

18	Topol-M, road mobile (5 regts)
6	RS-24 (MIRV)
Long-Range Aviation Command	
1	Sqn Tu-160 Blackjack *16 Tu-160 each with up to 12 Kh-55SM (AS-15B Kent) nuclear ALCM*
3	Sqn Tu-95MS Bear *32 Tu-95MS6 (Bear H-6) each with up to 6 Kh-55 (AS-15A Kent) nuclear ALCM* *31 Tu-95MS16 (Bear H-16) each with up to 16 Kh-55 nuclear ALCM*

China

Quantity	Role/Type
Strategic Missiles (figures are estimates)	
ICBM	
12	DF-31 (CSS-9)
24	DF31A (CSS-9 Mod 2)
10	DF-4 (CSS-3)
20	DF-5A (CSS-4 Mod 2)
IRBM	
80	FD-21 (CSS-5)
36	DF21C (CSS-5 Mod 3)
2	DF-3A (CSS-2 Mod)
SRBM	
108	DF-11A/M-11A (CSS-7 Mod 2)
96	DF-15/M-9 (CSS-6)
LACM	
54	CJ-10 (DH-10)
Navy	
1	Xia *With 12 JL-1 strategic SLBM*
2	Jin *With 12 JL-2 strategic SLBM*

India

Quantity	Role/Type
Strategic Forces Command	
2	MSL groups with SS-150/SS-250 Prithvi
1	MSL group with Agni-I
1	MSL group with Agni-II
IRBM	
80-100	Agni-I
20-25	Agni-II
N/A	Agni-III
SRBM	
60	MSL produced between 1993-1999
Up to 20	SS-150 Prithvi I/SS-250 Prithvi II
N/A	SS-350 Dhanush

Pakistan

Quantity	Role/Type
Army Strategic Forces Command	
105	Hatf-1
N/A	Abdali/Hatf-2
50	50 Hatf-3
Up to 10	Shaheen-1/Hatf-4
Up to 25	Hatf-5/Ghauri
N/A	Ghauri II

Based primarily on material in International Institute for Strategic Studies, *The Military Balance 2011* (London: Routledge, 2011). Figures do not include equipment used for training purposes. Some equipment and personnel figures are estimates. All equipment figures represent equipment in active service.

Figure 7.2: Chinese Missile Forces: 2010

China's Missile Force			
China's Missile Inventory	**Ballistic and Cruise**		***Estimated Range***
	Missiles	***Launchers***	
CSS-2	15-20	5-10	3,000+ km
CSS-3	15-20	10-15	5,400+ km
CSS-4	20	20	13,000+ km
DF-31	<10	<10	7,200+ km
DF-31A	10-15	10-15	11,200+ km
CSS-5	85-95	75-85	1,750+ km
CSS-6	350-400	90-110	600 km
CSS-7	700-750	120-140	300 km
DH-10	200-500	45-55	1,500+ km
JL-2	Developmental	Developmental	7,200+ km
Note: China's Second Artillery maintains at least five operational SRBM brigades; an additional two brigades are subordinate to PLA ground forces—one garrisoned in the Nanjing MR and the other in the Guangzhou MR. All SRBM units are deployed to locations near Taiwan.			

Based on Appendix 1 in Office of the Secretary of Defense, Annual Report to Congress, *Military and Security Developments Involving the People's Republic of China 2010,* August 2010.