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Asia's Naval Arms Race: Myth or Reality?

by

Desmond BALL
Strategic and Defence Studies Centre
Australian National University
Canberra
Australia

Official Telecommunications Provider

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Desmond Ball

Strategic and Defence Studies Centre

Australian National University

Canberra

Since around 2000, a sustained and rapid build-up of defence capabilities has been underway in the Asia-Pacific region, most especially in Northeast Asia. This build-up, which can be characterised as Round 2 of a build-up in the region that began in the late 1980s, has some disturbing features that were not present in the first round of this process. Most importantly, there is substantial evidence of action-reaction dynamics, of an emerging complex arms race in Northeast Asia, principally involving naval acquisitions, that was not present in the previous round.

Round 1, from the late 1980s to the mid-1990s, before it was truncated by the Asian economic crisis in 1997-98, saw defence expenditures in Asia increase at an unprecedented rate, resulting in a doubling of Asia's share of global military expenditure – from 11 per cent in the mid-1980s to 20 per cent in 1995. In the case of arms imports into the region, Asia's share of world expenditure on arms transfers more than doubled – from 15 per cent in the mid-1980s to 33 per cent in 1993 and to 41 per cent in 1998.[1]

However, as I argued in papers presented at the 7th and 9th Asia-Pacific Roundtables here in Kuala Lumpur in June 1993 and June 1995, there was little evidence of action-reaction dynamics in the acquisition programs in the 1980s and early 1990s.[2] Rather, those programs could best be explained in terms of 'modernisation', or the requirements for enhanced self-reliance in the context of a rapidly changing and increasingly uncertain regional security environment, with the extraordinary rates of economic growth across most of the region providing the largesse for the increasing defence budgets. For many countries, 'modernisation' involved the replacement of obsolescent equipment acquired in the 1960s and 1970s. This replacement process often involved substantial increases in qualitative capabilities, especially with respect to weapons, sensors and EW systems.[3]

By around 2000, nearly all the countries which had been severely affected by the economic crisis had resumed increasing defence budgets. For example, in Northeast Asia,

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[1] Desmond Ball, 'Arms Modernization in Asia: An Emerging Complex Arms Race', in Andrew T. H. Tan (ed.), *The Global Arms Trade: A Handbook*, (Routledge, London, 2010), pp. 30-51.

[2] Desmond Ball, 'Trends in Military Acquisitions: Implications for Security and Prospects for Constraints/Controls', in Bunn Negara and K. S. Balakrishnan (eds.), *The Making of a Security Community in the Asia-Pacific: Proceedings of the Seventh Asia-Pacific Roundtable, Kuala Lumpur, June 6-9, 1993*, (Institute of Strategic and International Studies, Kuala Lumpur, 1994), pp. 129-158; and Desmond Ball, 'Arms Acquisitions in the Asia Pacific: Scale, Positive and Negative Impacts on Security and Managing the Problem', in Thangam Ramnath (ed.), *The Emerging Regional Security Architecture in the Asia-Pacific Region: Papers Presented at the Ninth Asia-Pacific Roundtable, Kuala Lumpur, June 5-8, 1995*, (Institute of Strategic and International Studies, Kuala Lumpur, 1996), pp. 199-233.

[3] Desmond Ball, 'Arms and Affluence: Military Acquisitions in the Asia-Pacific Region', *International Security*, (Vol. 18, No. 3), Winter 1993-94, pp. 78-112.

South Korea, which was the hardest hit by the crisis, increased its defence spending by 6.2 per cent in fiscal year 2000-01; by 2007, its annual real increase had grown to 9.9 per cent.[4] China, of course, hardly faltered during the crisis; its defence budget has increased by double digit figures nearly every year since 1988, meaning that it has increased 8-fold over the last 20 years (according to official budget figures).

This has resulted in rough terms in a doubling of capabilities, as measured by major platforms, beyond the levels considered adequate for defence modernisation in the 1990s. Moreover, there is now considerable evidence of action-reaction dynamics in these Round 2 acquisitions.

The predominance of Northeast Asia and the rise of China

Northeast Asia accounts for the great bulk of the total defence expenditure and acquisitions in the region, including most of the more disturbing new capabilities. Japan, China, Taiwan, and North and South Korea account for more than 80 per cent of East Asian and Australasian defence expenditure (US$108.7 b., or 83 per cent in 2001; and US$196.83 billion or 83 per cent in 2006), and about three-quarters of total Asian defence expenditure (i.e., including South Asia) – 73 per cent in 2001 and 74 per cent in 2006. According to IISS estimates, China accounted for about 46 per cent of the total Asian expenditure in 2006.

There is enormous uncertainty about Chinese defence expenditures. The official budget was US$17 billion in 2001 and US$35.3 billion in 2006, but this includes only a part of the funds spent on defence. Outside estimates vary widely, with some as high as US$140 billion as far back as 1999.[5] The International Institute for Strategic Studies (IISS) has long produced estimates of Chinese defence expenditures which include estimates of the extra-budgetary military expenditures. In 2001, for example, it estimated that actual expenditure was US$47 billion, and in 2003, when the official budget was $22.3 billion, it estimated that actual expenditure was $55.9 billion. Since 2004, the IISS has adopted a 'purchasing power parity' (PPP) approach to estimating Chinese spending, which has produced figures more than three times as high as the official budget. In 2004, when the official budget was $25 billion, the IISS estimate jumped to $84.3 billion. In 2006, the IISS estimate was $122 billion. The Stockholm International Peace Research Institute (SIPRI), on the other hand,

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[4] *Asian Defence Journal*, September 2007, p. 55.
[5] Shaoguang Wang, 'The Military Expenditure of China, 1989-98', in *SIPRI Yearbook 1999: Armaments, Disarmament and Security*, (Oxford University Press, Oxford, 1999), pp. 333-349.

estimated that actual expenditure was US$49.5 billion in 2006,[6] while the US Defense Intelligence Agency (DIA) estimated it to be $80-115 billion.[7] The IISS estimate for 2008 was $114.1 billion.

China has now clearly overtaken Japan (US$41.1 billion in 2006, essentially stagnant since 2001) with respect to defence expenditures, making it the largest defence spender in Asia. According to the IISS figures, this happened around 2001, while SIPRI reckons it occurred in 2006.[8] According to the IISS figures, China is now the second largest defence spender in the world (after the US). Japan ranks fifth (after the UK and France). Both China and Japan are now well ahead of Germany and Russia, the sixth and seventh largest spenders in the world. South Korea ranks eleventh in the world.

The principal areas where action-reaction dynamics are evident include:

- Major naval capabilities;
- Long-range ballistic and cruise missiles, and missile defence systems;
- Electronic warfare (EW) systems; and
- Information warfare (IW) and cyber-warfare capabilities.

The emerging naval arms race

The naval acquisitions have become especially disturbing, with undeniable signs of action-reaction dynamics. East Asia is now embroiled in a serious maritime strategic competition. Highly capable 'blue-water' navies are being developed, with modern surface combatants (destroyers and frigates), aircraft carriers (euphemistically called 'amphibious transport ships' or 'sea control ships'), and new submarines, as well as land-based aircraft for both maritime surveillance and strike. Maritime surveillance and ELINT collection operations are being conducted with increasing intensity and intrusiveness. Hundreds of long-range anti-ship missiles (e.g., *Harpoons* and *Exocets*), which require over-the-horizon targeting capabilities, are being acquired. The proliferation of submarine- and ship-based land-attack cruise missiles is also underway.

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[6] Petter Stalenheim, Catalina Perdomo and Elisabeth Skons, 'Military Expenditure', in *SIPRI Yearbook 2007: Armaments, Disarmament and International Security*, (Oxford University Press, Oxford, 2007), chapter 8.
[7] Lieutenant General Michael D. Maples, 'Current and Projected National Security Threats to the United States', Statement for the US Senate Armed Services Committee, Washington, D.C., 27 February 2007, at http://armed-services.senate.gov/statemnt/2007/February/Maples%2002-27-07.pdf.
[8] Petter Stalenheim, Catalina Perdomo and Elisabeth Skons, 'Military Expenditure', in *SIPRI Yearbook 2007: Armaments, Disarmament and International Security*, p. 289.

According to a prescient analysis by Sam Bateman, the current naval acquisition programs have overtones of arms racing which were not present in the acquisitions prior to the economic downturn in 1997-98. As he has wrote in 2001:

> The 'first round' of naval expansion was argued away on the basis that it was part of an understandable non-threatening process of modernisation. This does not appear to be the case with this 'second round' of naval expansion which appears to be much more clearly posited on assessments of threats posed by other regional countries.[9]

The expansion of naval forces has been particularly rapid, and the evidence of reciprocal dynamics most apparent, in Northeast Asia. As Bateman concluded in 2001 with respect to this sub-region:

> Unfortunately [there is now] an element of acquiring new capabilities competitively to keep up with other navies. Certainly a strong element of technical modernisation is present but there is also a large element of competitiveness.[10]

The key naval areas where action-reaction dynamics are evident are:

- Modern surface combatants (destroyers and frigates);
- Large 'amphibious transport ships', helicopter carriers, or 'sea control ships';
- Submarines and anti-submarine warfare (ASW) capabilities;
- Sea-based air and missile defence capabilities; and
- Naval electronic warfare (EW) systems.

The United States maintains the most powerful naval and air forces in the Asia-Pacific region. The US Navy's Pacific Fleet, which covers the Pacific, Arctic and Indian Oceans, and which is the Navy's largest fleet, has five carrier battle groups and a carrier strike group, three cruiser groups, and six destroyer squadrons, as well as eight ballistic-missile carrying submarines (SSBNs) and 18 nuclear-powered attack submarines (SSNs). The Pacific Air Forces (PACAF) Command is the largest US Air Force Command, with about 375 aircraft, with bases in Hawaii, Japan, South Korea, Guam and Alaska. The Fleet Marine Force, Pacific, with 84,000 Marines and sailors, is the largest field command in the US Marine

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[9] W. S. G. Bateman, , *Strategic and Political Aspects of the Law of the Sea in East Asian Seas*, (PhD dissertation, Australian Defence Force Academy, University of New South Wales, Canberra, 2001), p. 85.
[10] Ibid, p. 90.

Corps. These forces have responsibilities which extend over as much as 50 per cent of the globe, but they are primarily directed against China.

The Japanese Maritime Self-Defense Force (JMSDF) is the most powerful Navy in the Asia-Pacific after the US Navy. Its recent acquisitions include four *Kongo*-class and two *Atago*-class *Aegis* destroyers, the three *Osumi* 8,900-ton LST amphibious assault ships commissioned between 1998 and 2003, a *Hyuga*-class 16DDH 13,500-ton helicopter-carrying destroyer commissioned in March 2009, and eleven *Oyashio*-class submarines. The acquisitions of the *Aegis*-equipped destroyers have been determined in large part by Chinese and North Korean ballistic missile developments, while other elements are indubitably intended to offset China's growing maritime capabilities.

It is expected that the JMSDF will acquire two more *Atago*-class *Aegis* destroyers, a fourth *Osumi*-class LST, at least one more *Hyuga*-class 16DDH, and six more submarines (to bring the total to 22) over the next four years.

For ASW purposes, the JMSDF now has more than 30 undersea SOSUS–type arrays connected to 14 shore stations, which have associated ELINT capabilities. This includes a new SOSUS system installed by the US Navy in 2006, which stretches from Sasebo down to Okinawa, where it comes ashore at the JMSDF's Ocean Observation Facility at White Beach, and which is reportedly designed primarily to monitor the movement of Chinese submarines between the East China Sea and the Pacific Ocean.

Construction of a new SIGINT station primarily for ocean surveillance purposes is planned to begin on Yonaguni Island, at the southern tip of the Ryukyu island chain in 2011.[11]

The Chinese Navy (PLAN) has more than 75 major surface combatants (destroyers and frigates), 65 submarines (including one *Xia*-class and two *Jin*-class SSBNs and six *Han*-class/Type 091 and *Shang*-class/Type 093 SSNs), and aspirations to acquire an aircraft carrier capability. Its recent acquisitions include two 8,000-ton *Sovremenny*-class destroyers purchased from Russia in 2000, with another two ordered in January 2002. Two more 6,000-

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[11] Ministry of Defense, *Defense Programs and Budget of Japan: Overview if FY 2011 Budget*, (Ministry of Defense, Tokyo, January 2011), p. 3; and 'Japan Mulls Deploying Border Security, Coast Monitor Units in Okinawa', *Japan Today*, 20 July 2010.

ton *Luhai*-class DDGs, as well as two Type 051C *Luzhou*-class destroyers, were built in the early 2000s. Numerous Type 054A or *Jiangkai-II* frigates are under construction.

There has been speculation about China interest in the acquisition of an aircraft carrier since at least the 1980s, usually misinformed and invariably premature, but some such capability now seems fairly close. In 1998, China purchased the former *Varyag*, a Soviet *Kuznetsov*-class multi-role carrier (with a displacement of about 33,000 tons) that was only 70 per cent complete when the Soviet Union collapsed. It was delivered in 2002 to the Dalian Shipyard in northern China, where refurbishment of the deck was completed in late 2006, and where it was renamed the *Shi Lang* (after the mainland Chinese general who conquered Taiwan in 1681). In late 2008, Chinese government spokesmen suggested that China would soon proceed with acquisition of its 'first aircraft carrier'. Defence Ministry officials said that carriers were 'a reflection of a nation's comprehensive power', that China would use any such carrier to 'safeguard its shores and defend sovereignty over coastal areas and territorial seas', that 'the navy of any great power... has the dream to have one or more aircraft carriers', and that 'the question is not whether you have an aircraft carrier, but what you do with your aircraft carrier'.[12] In October 2006, China reportedly signed a deal with Russia for the supply of up to 48 Sukhoi Su-33 *Flanker-D* carrier-capable fighter aircraft.[13] In September 2008, the *PLA Daily* announced that the first batch of 50 pilot cadets had been inducted at the Dalian Naval Academy to undergo training on 'ship-borne aircraft flight', while other training has reportedly recently also been conducted in the Ukraine.[14] In April 2011, it was reported on a Web-site affiliated with the *People's Daily* that 'the work on *Varyag*... has entered its last stage, with the hull being painted in the standard Chinese naval colour – light gray-blue'.[15] It was rumoured that the *Varyag*/*Shi Lang* will be assigned to the PLAN's South China Sea Fleet, and, further, that China intends to build another 'four to six aircraft carriers'.[16]

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[12] *Straits Times*, 18 November 2008; and Edward Wong, 'China Signals More Interest in Building Aircraft Carrier', *New York Times*, 23 December 2008.

[13] 'China to Buy Su-33 Carrier-based Fighters From Russia', *Defense Industry Daily*, 26 March 2009, at http://www.defenseindustrydaily.com/china-to-buy-su33-carrierbased-fighters-from-russia-02806/.

[14] Manu Pubby, 'China Begins Training of First Batch of Aircraft Carrier Fighter Pilots', *Indian Express*, 19 September 2008, at http://www.indianexpress.com/news/China-begins-training-first-batch-of-aircraft-carrier-fighter-pilots/363638; and Andrei Chang, 'China Seeks Ukraine's Help to Train Aircraft Carrier Pilots', *UPI. Com*, 10 December 2008, at http://www.upi.com/Business_News/Security-Industry/2008/12/10/China-seeks-Ukraines-help-to-train-aircraft-carrier-pilots/UPI-10311228940743/.

[15] 'China's First Aircraft Carrier to be Completed Soon: Reports', *The China Post*, 7 April 2011.

[16] Richard A. Bitzinger and Paul T. Mitchell, 'China's New Aircraft Carrier: Shape of Things to Come?', *RSIS Commentaries*, (No. 74/2011), 6 May 2011.

China now has the largest fleet of attack submarines in the world (62), with the US Navy's force falling to 53 in 2009. A new type of conventional attack submarine was recently launched at the Wuhan shipyards. China's attack submarines have also markedly increased their patrol rate, from two patrols in 2006 to six in 2007 and 12 in 2008. On 26 October 2009, a *Song*-class SSK surfaced within five miles of the aircraft carrier USS *Kitty Hawk*, inside its screen of escorts, near Okinawa. On 11 June 2009, an SSK collided with a sonar array being towed by the USS *John S. McCain* off the Philippines.[17]

Taiwan has recently acquired eight *Cheng Kung* (US *Perry*)-class frigates (the eighth entered service in 2004), six *Kang Ding* (French *La Fayette*)-class frigates, and four refurbished *Kidd*-class guided missile destroyers. President Bush announced in April 2001 that the US would sell Taiwan 'up to eight' conventional submarines; the project made no progress for several years, but in December 2007 Taiwan's legislature approved funding for to begin the design process, with at least one US submarine builder eager for the construction contract.[18] Taiwan's acquisitions are avowedly intended to offset China's growing capabilities.

In March 2001, South Korea's President Kim Dae-jung said that 'our navy will have a "strategic task force" for protecting the national interests and international peace [on a] blue water scale'.[19] South Korea has constructed the first of at least three KDX-111 *Aegis*-equipped destroyers; its ninth *Chang Bogo* submarine was delivered in 2001; it has announced that it will build nine advanced German-designed submarines by 2020; and it is acquiring four *Dokdo*-class LPX [Landing Platform Experimental] amphibious transport ships. The first of the LPXs was commissioned in July 2007, and named after the Dokdo islets in the Sea of Japan which South Korea contests with Japan. Its logo is inscribed with the words (in English): 'Project Power'. In November 2007, during a joint South Korea-US amphibious landing exercise, the *Dokdo* served as the exercise's command vessel with the landing force operation centre (LFOC) on board.[20] While North Korean capabilities

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[17] Mackenzie Eaglen and Jon Rodeback, 'Submarine Arms Race in the Pacific: The Chinese Challenge to U.S. Undersea Supremacy', *The Heritage Foundation*, (Backgrounder No. 2367), 2 February 2010, at http://www.heritage.org/research/reports/2010/02/submarine-arms-race-in-the-pacific-the-chinese-challenge-to-us-undersea-supremacy.
[18] Jesse Hamilton, 'Taiwan OKs Sub Money', *The Hartford Courant*, 21 December 2007, at http://www.ct.gov/oma/cwp/view.asp?q=411616&a=3422.
[19] Cited in W. S. G. Bateman, , *Strategic and Political Aspects of the Law of the Sea in East Asian Seas*, p. 86.
[20] Mingi Hyun, 'LPX Dokdo Leads US-ROK Exercise', 2 December 2007, at http://maritimeasia.blogspot.com/2007/12/lpx-dokdo-leads-us-rok-exercise.html.

obviously figure centrally in South Korea's force development, it is also clear that there is an element of competitiveness with Japan with respect to its major naval systems.

Electronic warfare (EW) capabilities

Most countries in East Asia are rapidly developing their electronic warfare capabilities, including their maritime EW capabilities.

EW operations require full and real-time intelligence concerning the adversary's electronic order of battle (EOB) – that is, catalogues of the plethora of communications systems, radars, and other electro-magnetic emitters which might be expected in area of operations. ESM [electronic support measures] systems, including ECM [electronic counter-measures] and ECCM [electronic counter-counter-measures] systems, have to be carefully tailored to an adversary's EW systems and techniques. It is a highly inter-active process which presumes identification of particular possible adversaries. In Northeast Asia, there is evident action-reaction with respect to naval EW capabilities.[21]

In the early 2000s, Japan decided to substantially increase its ELINT coverage of the Korean Peninsula, eastern China, and the East China Sea. In addition to a new SIGINT/COMINT station built on Kikai-jima in the northern part of the Ryukyu island chain, about half-way between Kyushu and Okinawa, which became operational in 2006, and which consists of a large indigenously designed circularly-disposed antenna array (CDAA) for VHF/HF DF purposes, Japan is building a network of three new SIGINT/ELINT stations. Construction of the first of these, involving the J/FLR-4 panoramic VHF/UHF/SHF system, began at Seburi-yama on Kyushu; it became operational in early 2007. The second station, on Miyako-jima, involves a J/FLR-4A system; it became operational in 2009. Another J/FLR-4A system is under construction on Fukue-jima; it is expected to become operational in 2012.[22]

Associated dynamics: nuclear weapons and missile developments

The proliferation of weapons of mass destruction (WMD) and long-range missile systems is now proceeding much more rapidly and extensively in Asia than in any other part

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[21] Desmond Ball, 'Intelligence Collection Operations and EEZs: The Implications of New Technology', *Marine Policy*, (No. 28), 2004, pp.67-82.

[22] Yoichi Kato, 'SDF Preparations All Have But Only One Target: China', *Asahi Shimbun*, 1-2 January 2011, p. 11.

of the world. It is both a much more complicated and a potentially more volatile process than the bipolar superpower strategic nuclear arms race of the Cold War. The proliferation process which is developing in Asia involves multidimensional dynamics. There are several bilateral competitors, some of which are engaged in multiple pairings. The most obvious direct nuclear competition is between India and Pakistan. A nuclear arms race between India and China, which is a real possibility, would be especially disturbing. The expansion of China's nuclear arsenal could also cause other countries in Northeast Asia to exercise their own nuclear options. Moreover, the dynamics now involve not only comparative nuclear capabilities, but interactive connections between nuclear postures and conventional capabilities.

Five of the world's nine nuclear countries are in Asia — including Russia, which still maintains hundreds of nuclear weapons in the Far East, as well as China, India, Pakistan and North Korea. The US also maintains hundreds of nuclear weapons in the Pacific, as well as hundreds of others based in the US itself but targeted on China, North Korea and the Russian Far East.

China is the largest nuclear power in Asia, with a stockpile of about 400 nuclear weapons and an active development program. Official US estimates credit China with only about 150 weapons, but this comprises only deployed 'strategic' missile- and bomber-delivered weapons, with no allowance for tactical weapons (including short-range missiles such as the DF-18) or non-deployed weapons held in reserve. It is likely that China has now overtaken Britain and perhaps even France to become the world's fourth or even third largest nuclear power.

North Korea conducted its first nuclear test on 9 October 2006 and its second on 25 May 2009, and may have a stockpile of more than 10 weapons.

There is also considerable proliferation of ballistic missile technology in the region, or at least in the Northeast and South Asia sub-regions. China has produced a full suite of intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs), intermediate-range ballistic missiles (IRBMs), medium-range ballistic missiles (MRBMs), and short-range, tactical ballistic missiles. Two new ICBMs are being produced — the *Dong Feng*-31 (DF-31), which is targeted primarily against Russia and other countries in Asia; and a longer range ICBM, the DF-31A, which is primarily targeted against the US (and which

replaces the aborted DF-41 program). China has also exported some short-range ballistic missiles elsewhere in the region (e.g., M-11 missiles, with a range of some 300 km, to Pakistan). China now has nearly 1,500 ballistic missiles facing Taiwan, a rapid increase from around 800 in 2006. They comprise DF-11, DF-15 and DF-15A medium-range missiles, with conventional warheads, and are based mainly in Fujian Province. Deployment of the new DF-16 MRBM, with a higher re-entry speed, began in early 2011.[23] China is also developing a long-range (2,000-3,000 km) anti-ship ballistic missile, designated the DF-21, known as the 'aircraft carrier killer', and referred to by some analysts as a potential 'game changer'.[24]

North Korea has some 30 *Scud* B/C launchers (with more than 200 missiles, according to the IISS, and about 700 according to a South Korean government estimate released in October 2010) and perhaps 15 *Nodong* launchers (with more than 90 missiles according to the IISS and about 200 according to the South Korean government).[25] It conducted tests of its *Taepodong* IRBM/ICBM on 31 August 1998, 5 July 2006 (which failed about 35-40 seconds after launch), and on 5 April 2009. South Korea has some 12 NHK (250 km) ballistic missiles. Taiwan is developing the 950 km range *Tien Ma* ('*Sky Horse*') ballistic missile.[26]

There is a serious danger of cruise missile proliferation in this region. Cruise missiles are technically easier to produce and cheaper to acquire than ballistic missiles. Enabling technologies such as anti-ship cruise missiles (e.g., *Exocets* and *Harpoons*), unmanned aerial vehicles (UAVs), GPS satellite navigation systems and small turbojet engines are now widely available. However, the development and deployment of cruise missiles are also more difficult to monitor.

Several countries in East Asia have either begun to indigenously design and develop long-range, land-attack cruise missiles (e.g., China), or to seriously consider the acquisition of such missiles. China's *Hong Niao* family of cruise missiles is armed with both nuclear and conventional warheads, with ranges up to 1,500-2,000 km (in the case of the HN-2, which entered service in 1996) and 4,000 km (in the case of the HN-2000, a supersonic version

[23] Rich Chang, 'China Aims New Missile Types at Taiwan, NSB Says', *Taipei Times*, 17 March 2011, at http://www.taipeitimes.com/News/front/archives/2011/03/17/2003498376.
[24] Ibid; and William Lowther, 'China Boosting Missile Strength: Think Tank', *Taipei Times*, 21 April 2011, at http://www.taipeitimes.com/News/front/archives/2011/04/21/2003501282.
[25] '"N.K. Has 200,000 Special Warfare Troops"', *The Korea Herald*, 11 October 2010, p. 2.
[26] 'Tien Ma 1 (Sky Horse1), Offensive Weapons', *Jane's Strategic Weapon Systems*, 13 September 2010, at http://articles.janes.com/articles/Janes-Strategic-Weapon-Systems/Tien-Ma-1-Sky-Horse-1-Taiwan.html.

which is currently in development). Taiwan tested a *Hsiungfeng 2E* cruise missile in 2007; it may have a range of about 1,000 km, enabling it to reach Shanghai.[27]

These missile developments have prompted responses in Japan, China and Taiwan with respect to missile detection and tracking capabilities, and air defence and ballistic missile defence (BMD) systems, in which sea-based platforms play important roles.

Following the North Korean *Taepodong-1* launch on 31 August 1998, Japan decided to embark with increasingly growing enthusiasm on the acquisition of a ballistic missile defence (BMD) system, consisting according to current plans of about 200 *Patriot* Advanced Capability (PAC)-3 interceptors for terminal missile defence and eight *Kongo*-class *Aegis* destroyers fitted with SM-3 missiles for mid-course interception. In December 2007, an SM-3 (Block 1A) launched from the *Kongo* (DDG-173) successfully intercepted a ballistic missile in a test exercise in the mid-Pacific.[28]

Japan also decided to develop an indigenous capability for tracking ballistic missiles as well as high-speed aircraft and cruise missiles. A prototype J/FPS-XX radar was built at Chiba in 2000-03. It monitored the test of a Russian SLBM launched from a submarine in the Sea of Okhotsk in November 2005. The JDA announced on 31 August 2005 that it was proceeding with the construction of four permanent J/FPS-5 stations. The first has been constructed at Shimokoshiki in Kagoshima prefecture, Kyushu, where surveying and construction started in 2006, and which achieved an initial operational capability (IOC) in early 2009, just in time to monitor the *Taepodong-2* launch in April 2009. The other three J/FPS-5 systems located at Sado Shima in Niigata prefecture, scheduled to become operational in early 2010; Kamabuse-yama in Aomori prefecture, to become operational in early 2011, and Yozadake, on Okinawa Island, to be operational by March 2012.[29]

The Shimokoshiki and Yozadake stations are best-placed for monitoring Chinese missile trajectories, while the Kamabuse-yama and Sado Shima stations are best for monitoring missiles fired from North Korea.

On 28 March 2009, as North Korea began to prepare for its *Taepodong-2* launch that took place on 5 April, three *Aegis*-class destroyers with AN/SPY-1 radars were deployed to

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[27] Desmond Ball, 'Arms Modernization in Asia: An Emerging Complex Arms Race', in Andrew T. H. Tan (ed.), *The Global Arms Trade: A Handbook*, pp. 47-48.
[28] 'Japan Test Fires Its First Raytheon-Built Standard Missile-3', *Space War*, 20 December 2007, at http://www.spacewar.com/reports/Japan_Test_Fires_Its_First_Raytheon_Built_Standard_Missile_3_999.html.
[29] Yoichi Kato, 'SDF Preparations All Have But Only One Target: China', *Asahi Shimbun*, 1-2 January 2011, p. 11.

monitor the test. Two, the *Kongo* and *Chokai*, were deployed to the Sea of Japan off Akita Prefecture, with the *Kongo* closer to the Korean Peninsula. (Within three minutes of its detection, computers on the destroyers were able to calculate the missile's path. If the missile appeared likely to land on Japanese territory, the Self-Defense Forces were ordered to destroy the missile). The third, the *Kirishima*, went to the Pacific, about 1,000 kilometers east of Fukushima Prefecture, to monitor the second-stage separation and firing of the third stage.[30]

China successfully conducted a BMD test on 11 January 2010, when a HQ-19 surface-to-air missile equipped with a new exo-atmospheric kinetic kill vehicle intercepted a target missile. The test followed news that the US had approved the supply of 330 PAC-3 interceptors to Taiwan.[31]

A broader context: Action-reaction and Information Warfare (IW) capabilities

Although the investments have been too small to figure in defence budgets, and are generally covert anyway, many countries in the region have been acquiring information warfare (IW) capabilities — from Internet monitoring and manipulation to strategic deception, to capabilities for destroying or incapacitating the critical information infrastructure of notional adversaries (including their defence C^3I systems).

China began to implement an IW plan in 1995, and since 1997 has conducted several exercises in which computer viruses have been used to interrupt military communications and public broadcasting systems. In April 1997, a 100-member élite corps was set up by the Central Military Commission to devise 'ways of planting disabling computer viruses into American and other Western command and control defence systems'.[32] In 2000, China established a strategic IW unit (which US observers have called 'Net Force') designed to 'wage combat through computer networks to manipulate enemy information systems spanning spare parts deliveries to fire control and guidance systems'.[33] Senior US defence officials testified to the House Armed Services Committee in January 2010 that US military

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[30] Wendell Minnick, 'Japanese Monitoring Sites Keep Eye on North Korea', *Defense News*, 3 April 2009, at http://www.defensenews.com/story.php?i=4021967; and Misako Toki, 'Japan's Response to the North Korean Satellite Launch', *Bulletin of the Atomic Scientists*, 3 April 2009, at http://www.thebulletin.org/web-edition/features/japans-response-to-the-north-korean-satellite-launch.

[31] Wendell Minnick, 'China Missile Test Has Ominous Implications', *Defense News*, 19 January 2010, at http://www.defensenews.com/story.php?i=4460204; and Jeffrey Lewis, 'Chinese Missile Defense Test', *Arms Control Wonk*, 12 January 2010, at http://lewis.armscontrolwonk.com/archive/2588/chinese-missile-defense-test.

[32] Ivo Dawnay, 'Beijing Launches Computer Virus War on the West', *The Age* (Melbourne), 16 June 1997, p. 8.

[33] Jason Sherman, 'Report: China Developing Force to Tackle Information Warfare', *Defense News*, 27 November 2000, pp. 1, 19.

and government networks and computer systems were increasingly subject to intrusions that evidently originated from China, and that while 'most intrusions focus on exfiltrating data', the skills being demonstrated indicated the development of 'an advanced information warfare capability to establish control of an adversary's information flow and maintain dominance of the battlespace'.[34]

In August 1999, following a spate of cross-Straits attacks against computer networks and official web sites in Taiwan, the Minister for National Defense in Taipei announced that the MND had established a Military Information Warfare Strategy Policy Committee and noted that 'we are able to defend ourselves in an information war'.[35] In December 2000, this committee was expanded and converted into a battalion-size centre under the direct command of the General Staff HQ, with responsibilities for network surveillance, defence, and countermeasures.[36] In May 2000, Japan announced plans to establish a Research Institute and an operational unit for fighting cyber-terrorism.[37]

North Korea reportedly set up a cyber-warfare unit in the late 1980s. Media reports actually refer to two different places, but these may be different elements of the one agency. An electronic communications monitoring and computer hacking group from the State Security Agency is reportedly located at the Korea Computer Centre in Pyongyang.[38] The North Korean Army created a dedicated cyber-warfare unit, called Unit 121, in 1998. Its staff is estimated to include from 500 to more than 1,000 'hackers'. (The South Korean government estimated 600-700 in October 2010).[39] Its capabilities include 'moderately advanced distributed denial of service (DDOS) capability' and 'moderate virus and malicious code capabilities'. In October 2007, North Korea tested a 'logic bomb' containing malicious code designed to be executed should certain events occur or at some pre-determined time; the test led to a UN Security Council resolution banning sales of mainframe computers and lap-

[34] John T. Bennett, 'Chinese Buildup of Cyber, Space Tools Worries U.S.', *Defense News*, 13 January 2010, at http://www.defensenews.com/story.php?i=4452407.
[35] 'MND Sets Up Information Warfare Committee', *ADJ News Roundup*, August 1999, p. 14.
[36] Wendell Minnick, 'Taiwan Upgrades Cyber Warfare', *Jane's Defence Weekly*, 20 December 2000, p. 12.; and Darren Lake, 'Taiwan Sets Up IW Command', *Jane's Defence Weekly*, 10 January 2001, p. 17.
[37] 'Tokyo's Claim to Tok-do Escalates Korea-Japan Cyber War', *The Korea Times*, 14 May 2000, at http://www.koreatimes.co.kr/times/200005/t2000051417253540111136.htm.
[38] John Larkin, 'Preparing for Cyberwar', *Far Eastern Economic Review*, 25 October 2001, p. 64.
[39] '"N.K. Has 200,000 Special Warfare Troops"', *The Korea Herald*, 11 October 2010, p. 2.

top PCs to North Korea.[40] North Korea also uses cyber-space extensively for its propaganda or psychological warfare campaigns.[41]

IW and related cyber-warfare or Network-centric warfare (NCW) activities are intrinsically target-specific. They require detailed knowledge of the telecommunications architectures of selected prospective targets, as well as the *pro formas* they use for computer-to-computer data exchanges, and identification of the 'back door' access points for insertion of viruses and 'Trojan horses'. And these activities involve action-reaction phenomena, as an intruded party takes measures to address its vulnerabilities and the intruder responds with new viruses and insertion techniques.

The prospects

Asia has now been involved in a sustained build-up of defence capabilities for two decades, hardly affected by economic tribulations. However, the character of the acquisition dynamics began to change around the end of the 1990s. Whereas the acquisitions in the first decade could be explained by and large in terms of modernisation, they have in some places in the past decade involved substantial competitive elements. This combination of increasing capabilities and action-reaction is the essence of arms-racing. It may still not be the dominant driver of the acquisitions throughout the region, but it is playing an increasingly significant role in some sub-regions, most especially with respect to naval acquisitions in Northeast Asia. Even in Southeast Asia, arms-racing behaviour has been manifest in a couple of areas (fighter aircraft and submarines) in Singaporean and Malaysian acquisitions.

It is likely that, over the next 1-2 decades, the role of arms-racing will continue to increase. Action-reaction generates its own momentum. Further, there are no arms control regimes whatsoever in Asia that might constrain or constrict acquisitions. Moreover, prospective regional security dynamics, including prospective arms racing, will be much more complex than those which obtained in the old bipolar Cold War situation. There are none of the distinctive categories, milestones and firebreaks which were carefully constructed during the Cold War to constrain escalatory processes and promote crisis stability. Now, there are also interactions between conventional weapons acquisition programs on the one

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[40] Kevin Coleman, 'Inside DPRK's Unit 121', *DefenseTech.org*. 24 December 2007, at http://www.defensetech.org/archives/003920.html. See also 'North Korea Operating Computer-hacking Unit', *The Korea Herald*, 28 May 2004, at http://asiamedia.ucla.edu/article-eastasia.asp?parentid+11559.
[41] 'North Korea's Information Technology Advances and Asymmetric Warfare', *WMD Insights*, April 2006, at http://www.wmdinsights.org/14/EA1_NorthKoreaInfoTech.htm.

hand and developments with WMD and long-range delivery systems on the other hand. South Korea and Japan have responded to the development of ballistic missiles by China and North Korea by greatly enhancing their airborne intelligence collection and early warning capabilities and their land- and sea-based theatre missile defence (TMD) capabilities. US nuclear strategy has moved to permit virtually commutual employment of nuclear forces, precision conventional capabilities and information operations (IO), and to permit the use of nuclear weapons in otherwise non-nuclear situations. In this environment, with many parties and many levels and directions of interactions, the possibilities for calamity are high.