ISAS Insights

No. 78 – Date: 20 July 2009

469A Bukit Timah Road
#07-01, Tower Block, Singapore 259770
Tel: 6516 6179 / 6516 4239
Fax: 6776 7505 / 6314 5447
Email: isassec@nus.edu.sg
Website: www.isas.nus.edu.sg

India's Nuclear Navy: Catching up with China[1]

C. Raja Mohan[2]

Abstract

The launch of India's indigenous nuclear-powered submarine on 26 July 2009 marks a major breakthrough in the nation's efforts to build a nuclear navy and close the gap with China's growing underwater deterrent capability. New Delhi, like Beijing, had to struggle for decades to advance on its maritime nuclear project, involving the technologies of nuclear propulsion, underwater launch of ballistic missiles and the art of operating nuclear submarines. Although China is well ahead of India in the deployment of a credible sea-based deterrent, the time has come for Beijing and New Delhi to start a substantive dialogue on nuclear and maritime confidence building measures.

Introduction

Many decades ago, Chairman Mao Zedong reportedly told his naval commanders that they "must build a nuclear submarine in China even if it took ten thousand years". Indian leaders, not generally known for such earthy expressions of national political will, would have readily agreed with Mao.

As India prepares to launch its first indigenously built nuclear-powered submarine at the end of July 2009,[3] it is not difficult to see the parallel with China. The nuclear submarine, now christened *INS Arihant*, had been in the works for nearly three decades. Widely known as the Advanced Technology Vessel (ATV), the project suffered repeated technological, engineering and organisational setbacks. It is persistent political support and the navy's dogged pursuit that has now brought the project to its culmination. To be sure, there is a considerable distance to go before *INS Arihant* is declared operational. However, there is no denying that unveiling the vessel marks a breakthrough for India on naval nuclear propulsion. It also sets the stage for India's eventual deployment of some nuclear weapons at sea. Until now, only the five nuclear weapon states have operational nuclear submarines. While the

---

1 This paper has been prepared as part of an ongoing consultancy project for the Institute of South Asian Studies, an autonomous research institute at the National University of Singapore.

2 C. Raja Mohan is a Professor of South Asian Studies at the S. Rajaratnam School of International Studies at Nanyang Technological University, Singapore. He can be contacted at crmohan53@gmail.com.

3 Amitav Ranjan and Shishir Gupta, "All set for a quiet launch of India's first indigenous N-Sub", *The Indian Express* (New Delhi), 8 July 2009, p. 1; see also, Rajat Pandit, "N-Sub's here in 10 days", *Times of India* (New Delhi), 17 July 2009, p. 11.

achievement is significant, India is fully aware that it is well behind China in the building of conventional submarines, developing marine nuclear reactors and mastering the technology of submarine-launched nuclear tipped ballistic missiles (SLBMs). Meanwhile, China itself is decades behind the United States and Russia in operating a credible nuclear navy. This paper reviews the recent significant naval nuclear developments in India, puts them in a comparative perspective in relation to China, and speculates on their future evolution. The paper also offers a preliminary assessment of how India's emerging maritime nuclear capabilities might impact the Sino-Indian naval dynamic as well as the nuclear calculus of other great powers, especially the United States.

The Doctrinal Context

The India government's interest in imparting a nuclear capability to its navy emerged out of the broader nuclear debate in the late 1970s amidst credible reports that Pakistan was close to acquiring nuclear weapons. Although it was China's first nuclear test in 1964 that set off the Indian nuclear debate and resulted in India's first nuclear test in May 1974, it was not until the late 1970s and early 1980s that Delhi devoted serious attention to its nuclear strategy and policy.[4] As part of the many decisions that called for an intensified investment in a range of technologies related to the weaponisation of India's nuclear option, Delhi also decided to build an indigenous nuclear propelled submarine as well as lease a nuclear submarine from the Soviet Union for training Indian naval personnel. At around the same time, in 1983, India also launched the Integrated Guided Missile Development Programme (IGMDP).[5] Sea-based missiles were, of course, way down the priority list of the IGMDP, which concentrated on the development of surface-to-surface ballistic missiles. Together, the three decisions were critical for developing the Indian navy's nuclear dimension. When India announced its first draft nuclear doctrine in 1999, it emphasised two seemingly contradictory principles. One was that India would limit itself to a credible minimum deterrent and had no wish to embark on an arms race with any other country. At the same time, the doctrine also declared that it would develop a classical 'triad' of delivery systems. The triad refers to the deployment of nuclear weapons on bomber aircraft, land-based missiles and submarine launched missiles. Most western analysts argued that building a triad is not compatible with the notion of minimum deterrence and expressed disdain for the prospect of India building an underwater deterrent capability, the most difficult of the triad systems. Yet, India's draft nuclear doctrine was quite clear that "India's nuclear forces will be effective, enduring, diverse, flexible, and responsive to the requirements in accordance with the concept of credible minimum deterrence. These forces will be based on a triad of aircraft, mobile land-based missiles and sea-based assets".[6] Whatever the limitation on its extant capabilities, India was quite clear that its nuclear arsenal would be balanced and not be trimmed in order to accommodate the international criticisms. In underlining its commitment to the development of sea-based nuclear delivery systems within the framework of a credible minimum deterrent, India was very much following the footsteps of China's nuclear evolution.

As the weakest of the nuclear weapon powers that had to operate in an environment that was constrained by resources, managing the contradiction between the imperatives of credibility

---

4 For a history of India's nuclear weapons programme, see George Perkovich, *India's Nuclear Bomb: The Impact on Nuclear Proliferation* (Berkeley, CA: University of California Press, 2002).

5 For a recent review of India's missile and space programme, see Harsh V Pant and Bharath Gopalaswamy, "India's Emerging Profile in Space", *The RUSI Journal*, Vol. 153, No. 5, pp. 66-71.

6 The *Draft Report National Security Advisory Board on Indian Nuclear Doctrine, August 17, 1999* available at http://www.pugwash.org/reports/nw/nw7a.htm accessed on 12 July 2009.

and minimalism was central to the conception and organisation of the Chinese nuclear deterrent. Despite its conflicts with both Soviet Russia and the United States, China deliberately chose not to imitate the nuclear doctrine of the superpowers and chose instead to maintain a modest arsenal.[7] Some argue that the nuclear logic has begun to change in Beijing and that we might see a significant expansion of its nuclear arsenal and a shift from the doctrine of 'minimum deterrence' to one that is now called 'limited deterrence'. Others however question the evidence and argument that the Chinese arsenal is on the verge of a rapid expansion.[8] Well before this presumed shift or otherwise, the Chinese leadership was quite clear in its mind that while it will maintain a small nuclear arsenal, it must definitely be a balanced one. In other words, a sea-based arsenal, despite all its technological challenges, must be built to make the Chinese deterrent credible and put it on equal footing – if only symbolically and psychologically – with the other nuclear weapon powers. Put simply, minimum deterrence did not mean that China would forgo certain elements of the nuclear triad. The Chinese political and military leaders were fully aware that a submarine carrying nuclear tipped missiles was not just a symbol of technological advancement, but would make Beijing invulnerable to any nuclear threats or blackmail.[9] For both China and India, sea-based nuclear weapons offered a secure second strike capability. This was the context in which Mao exhorted Beijing to do whatever it takes to build a nuclear submarine. The same logic had equal appeal in New Delhi, which was "convinced that acquisition of a nuclear submarine will provide the most reliable deterrence and also give its navy a true blue water status" and that "no country having a nuclear capability should be without a nuclear submarine".[10]

India's Maritime Nuclear Development

Not too soon after its first atomic test, India embarked on the development of three essential technologies needed for a nuclear submarine programme – a marine reactor that can be integrated with a submarine platform, nuclear-tipped missiles that can be launched from underwater, and the operational skills to run a nuclear submarine. The programme to build the platform, called the ATV, has been underway since the mid 1970s. The construction of a prototype has already taken more than three decades, highlighting the gap between India's nuclear strategic ambition and its industrial and technological capabilities. The difficult challenge in developing a nuclear reactor for the submarine lies in its small size. This involves a lot more than simply scaling down the design of a traditional land-based reactor. Producing a small reactor involves sophisticated engineering skills. Although India's Department of Atomic Energy has been building power and research reactors since the 1960s, designing and building the reactor for the ATV was an entirely different ball game. For one, the design of the reactor must cope with very high power densities in a limited space. Reducing the size of the reactor core requires that it be run on enriched uranium. The higher the level of enrichment, the smaller the potential size. Unlike in the traditional reactors, the fuel for naval reactors is not made of uranium oxide, but a uranium-zirconium metal alloy. The design aims at a long life for the reactor without any need for a fuel recharge. The long core life produces its own problems, when the fuel itself and the various materials at the heart

---

7 For a review of China's minimum deterrent posture, see Jeffrey G. Lewis, *The Minimum Means of Reprisal: China's Search for Security in the Nuclear Age* (Cambridge, MA: MIT Press, 2007).

8 For a recent discussion of some of these issues, see Paul J. Bolt and Albert S. Willner, eds., *China's Nuclear Future* (Boulder, CO: Lynne Reinner, 2006).

9 For the history of China's development of underwater nuclear deterrent, see John W. Lewis and Xue Litai, *China's Strategic Sea Power: The Politics of Force Modernization in the Nuclear Age* (Stanford, CA: Stanford University Press, 1994).

10 Vijay Sakhuja, "Sea-based deterrence and Indian security", *Strategic Analysis*, Vol. 25, No. 1, (April 2001), p. 31.

of the reactor suffer radiation damage and become vulnerable to cracks. Accidents in naval nuclear reactors tend to be higher than in normal reactors. Therefore, building a small, mobile, safe and easy to use nuclear reactor has tested even the advanced countries. That India is about to launch the ATV implies that the Department of Atomic Energy (DAE) and its partners have overcome many of the troubles of designing the reactor and have become confident about their designs. There is no doubt that India's mastery of naval nuclear propulsion is some distance away. However, it is likely to improve as it tests and eventually operates the ATV.

Thanks to the extraordinary secrecy surrounding the project, there has been little official information available on the programme. As it inched towards completion in recent years, the veil over the ATV programme has been lifted a little. In early 2009, the Indian Defence Minister A. K. Antony announced that most bottlenecks to the ATV project have been overcome and that the vessel would be launched this year.[11] According to a variety of unconfirmed reports, the Indian navy has the authorisation to build at least five nuclear submarines based on the ATV.[12] Based on media reports, the ATV will be powered by a 100 MW reactor, built by the DAE in collaboration with the Defence Research and Development Organisation and the navy. Reports claim that the ATV could be 124 metres long and have a displacement of 4,000 tonnes. The test bed reactor, apparently being built at the Kalpakkam Indira Gandhi Centre for Atomic Research in the DAE complex at Kalpakkam outside Chennai, went critical in 2004 and since then has been undergoing tests on mating it with the hull of the ATV. The enriched uranium fuel for the reactor has apparently been produced at the Rare Materials Project at Ratnahalli near Mysore in Karnataka. The delay in the supply of enriched uranium has reportedly been one of the many reasons that caused such long delays in the launch of the first ATV, now christened *INS Arihant*. The cost of the programme until mid-2009 has been estimated at around US$3 billion.[13] For India, it was probably never a question of cost but of mastering an important strategic technology. For New Delhi, it was also about the determination to catch up with China on the development of a sea-based deterrent.[14]

While India has every reason to be pleased at the progress of the ATV project, there will be special satisfaction at the kind of organisational and technological innovations that facilitated forward movement. The ATV project not only brought together a number of governmental agencies, but also the private sector. Larsen & Toubro, which has emerged as a major player in India's domestic private sector shipbuilding industry, has been associated with the Indian nuclear and space programmes, and appears to have contributed significantly to the success of the ATV.[15] While much of the work on ATV has been indigenous, it is quite clear that cooperation with Russia has played a rather critical role. The Russian decision to lease a

---

[11] Manu Pubby, "India's First Nuke Sub Soon", *The Indian Express* (New Delhi), 12 February 2009; available at <http://www.indianexpress.com/news/indias-first-nuke-sub-soon-antony/422389/> accessed on 16 July 2009.

[12] For a comprehensive survey of public sources, see The Federation of American Scientists, "The Indian SSN Project: An Open Literature Analysis", available at <http://www.fas.org/nuke/guide/india/sub/ssn/part01.htm> accessed on 10 July 2009.

[13] Varun Sood and James Lamont, "India set to launch nuclear submarine", *Financial Times* (London), 9 July 2009, available at <http://www.ft.com/cms/s/0/c4d49e94-6c1e-11de-9320-00144feabdc0.html> accessed on 15 July 2009.

[14] Rajat Pandit, "India worried about china's growing N-sub prowess", *Times of India* (New Delhi), 6 May 2008, p. 1.

[15] Among the more informative reports is, Rahul Bedi, "India's Nuclear Powered Submarine Project Moves Ahead", *The Tribune* (New Delhi), 19 May 2007, p. 9.

Charlie I Class (named *INS Chakra* by India) nuclear submarine to India during 1988-91 was an important catalyst in the evolution of the ATV. Russian crew reportedly operated the reactor and gave the Indian naval and scientific personnel valuable training in the management of a nuclear submarine.[16] Besides the training function, the *Chakra* became a valuable test bed for developing indigenous capabilities in the design, maintenance and operation of naval reactors. Cooperation with Russia has been revived with the Indian decision to lease one or two *Akula II* class submarines from Russia. The deal first announced in the early years of this decade involved Indian financing of the building of the boats to be leased. According to one report, the total cost of building two *Akula* class submarines for India and the training of the crew was to cost up to US$2 billion.[17] Since then there were many difficulties in implementing the deal,[18] and the vessel that was to be sent out to India had a major accident in November 2008. Amidst a general political controversy in New Delhi over the reliability of Russia as an arms supplier, Moscow and Delhi have now agreed to speed up the implementation of the deal, that is reported to have been scaled down to the lease of just one boat. Displacing 12,000 tonnes, the *Akula II* class submarine is believed to be quieter and deadlier than any other nuclear attack submarine in the Russian fleet.[19] Unlike the previous time, after the initial training in Russia, the Indian crew is expected to fully man the operations of the leased submarine. Until now the external cooperation on the nuclear submarine project has been limited to Russia. There are indications that India is also exploring the possibilities of such cooperation with France, which is building *Scorpene* advanced diesel submarines in India.[20]

The third element of India's maritime nuclear project is the development of an appropriate nuclear tipped missile system for the ATV and its eventual nuclear submarine fleet. Some analysts suggest that India might originally have conceived the nuclear submarine as an attack boat rather than a platform to carry nuclear armed missiles. All reports now indicate that India is developing two naval nuclear systems for its sea-based deterrent.[21] One is the *Dhanush*, a ship-based surface to surface missile. A variant of the Indian *Prithvi* missile, the *Dhanush*, with its short range of 300 kilometres may not be of strategic value to the navy. It later has turned out that the *Dhanush* was a test bed for the development of other technologies, rather than the vehicle for the sea-borne deterrent. India's current hopes for underwater delivery of nuclear weapons rest on the *Sagarika* system that is also often referred to as the K-15 missile. In the media reports there has been considerable confusion on the name and the nature of the technology. While some have called it a ballistic missile, others have referred to it as a cruise missile. But the successful underwater test of a ballistic missile in 2008, with an estimated range of about 700 kilomteres seemed to give the basic test bed for

16 This Western claim is apparently based on Russian sources. See, NTI, "Submarine Proliferation: India, Current Capabilities", December 2008; available at <http://www.nti.org/db/submarines/india/index.html> accessed on 10 July 2009.

17 "Project 971 Shuka-B Akula class", available at http://www.globalsecurity.org/military/world/india/s-akula.htm accessed on July 16, 2009.

18 Vera Ponomaryova, "Nuclear subs on lease from Russia to India," 16 August 2005, Bellona Foundation website – <http://www.bellona.no/en/international/russia/nuke-weapons/nonproliferation/39412.html> – accessed on 16 July 2009.

19 RIA Novosti, "India-bound Russian Nuke Sub Repaired, Resumes Sea trials", 10 July 2009, available on <http://sify.com/news/fullstory.php?a=jhkp4bebdeb&title=India_bound_Russian_nuke_sub_repaired_resumes_sea_trials> accessed on 16 July 2009.

20 Siddharth Srivatsava, "India's nuclear submarine plan surfaces", *Asia Times Online*, 20 February 2009; available at < http://www.atimes.com/atimes/South_Asia/KB20Df02.html> accessed on 16 July 2009.

21 Robert S. Norris and Hans M. Kristensen, "Nuclear Notebook: Indian nuclear forces, 2008", *The Bulletin of the Atomic Scientists*, Vol. 64, No. 5, pp. 38-40.

a long sought secure deterrent capability for India.[22] India is also reported to be developing a cruise missile, called *Nirbhay*, similar to the United States' Tomahawk SLCM. According to reports, *Nirbhay* might be capable of delivering nuclear warheads up to a range of 1,000 kilometres from a variety of platforms including submarines.[23]

Catching up with China

While the launch of the ATV marks India's arrival on the nuclear maritime domain, its sea-borne nuclear capability is a long distance away from becoming a credible force. As a prototype, the ATV itself needs many years of sea trials which will in turn allow the Indian naval and nuclear establishments to tweak the design and make it an effective delivery system for underwater nuclear weapons. The launch certainly stirs up nuclear nationalism, and mobilises stronger political and financial support in favour of catching up with the nuclear naval capacities of Beijing. Meanwhile, it must be borne in mind that China itself is in the process of closing its long gap with the United States on underwater technologies. India will have to overcome many of the same difficulties China had to in the last few decades on the path to a credible underwater deterrent. Given its international isolation immediately after the proclamation of the People's Republic, its conflict with the United States in the 1950s, the overwhelming superiority of the United States and Japanese navies in the Western pacific, and the variety of maritime territorial disputes with its neighbours in East Asia and Southeast Asia, China has always emphasised the importance of submarines. Even in the current phase of its naval modernisation, building advanced conventional submarines in large numbers has remained an important priority for China.

As it declared itself a nuclear weapon power after the first test in 1964, China has given considerable emphasis to building both nuclear attack submarines (the SSNs) as well as ballistic missile carrying nuclear powered delivery systems (the SSBNs). The Chinese political leaders, naval commanders and the nuclear scientific establishment fully understood the significance of the twin development of SSNs and SSBNs. From 1965 to 1968, the People's Liberation Army Navy (PLAN) focused on the development of the experimental Type-091 *Han* class SSN. Although the turbulence of the Cultural Revolution had its impact on the programme, the first *Han* class vessel was launched at the end of 1971. The same design was used to develop a separate SSBN (Type 092) of the *Xia* class. It is believed that not more than two operational *Xia* class SSBNs were built, given the serious difficulties with developing a safe and reliable reactor. The first of them was deployed in the early 1980s. On 15 October 1985, China launched its JL-1 submarine launched missile from the *Xia* class platform, but it was considered a failure.[24] With the *Xia* class falling below expectations, the Chinese intensified their efforts during the 1980s and 1990s to develop a credible SSBN equipped with a powerful SLBM. China was fortunate to have a strong naval commander, Admiral Liu Huaqing, who was determined to build a powerful nuclear force at sea. Admiral Liu, who is often called China's Mahan, was the head of the PLAN during 1992-98 and the powerful Vice Chairman of the Central Military Commission (1989-97). During his stewardship, Liu succeeded in laying the foundation for a new generation of the SSN as well

---

[22] Ibid.

[23] See "Sagarika/K-15/Shourya/Nirbhay: Weapons of Mass Destruction", Global Security, available at <http://www.globalsecurity.org/wmd/world/india/sagarika.htm> accessed on 16 July 2009.

[24] Ta-Chen Cheng, "The Evolution of China's Strategic Weapons", *Defense and Security Analysis*, Vol. 22, No. 3, pp. 248-49.

as the SSBN. The Chinese political leaders fully backed this effort.[25] As a result of these efforts, China launched its second generation SSN called the *Shang* class, also called Type 093. Two *Shang* class vessels were launched in 2002 and 2003. The first pictures of this submarine came into public view in 2008. Faster, stealthier and exponentially lethal, the *Shang* class submarines have the capability to operate in the Indian Ocean. If the *Shang* class submarines give China a significantly improved capability to attack other naval vessels, it is the *Jin* class (Type 094) SSBNs that promise to showcase China's rise as a nuclear weapon power. Western analysts assess that China may build five or six *Jin* class submarines in the coming years. Each of these will be equipped with 12 powerful long-range SLBMs. The JL-2 missiles have an estimated range of at least 7,200 kilometres and its warheads are believed to have sophisticated penetration aids. When inducting these into service, China would more than match Britain and France in terms of the technological sophistication of its nuclear arsenal and its credibility as a survivable second strike force.[26]

The Sino-Indian Nuclear Dynamic

The Indian navy has been closely monitoring the extraordinary scale and scope of the modernisation of China's naval nuclear capabilities and their increased operational patrols. India is conscious of the huge nuclear gap that separates it from China. But after the launching of the indigenous nuclear submarine *INS Arihant* in July 2009 and the acquisition of the Russian *Akula II* class submarine, as well as *INS Chakra* by the end of 2009, the Indian maritime strategic community will be confident of its ambitious goal to narrow the nuclear gap with China. As Beijing and New Delhi take their nuclear weapons to sea, they begin to impact on the strategic calculus of the other great powers. The recent advances in the modernisation of China's naval forces have begun to ring alarm bells in the United States. Many United States analysts have begun to question the wisdom of America's naval force reductions at a time when China is improving its underwater war-fighting capabilities. Some argue that China might be able, in the not too distant future, to constrict the current absolute freedom of movement that the United States navy enjoys in the Western Pacific. In any case, the somewhat benign and condescending approach to Chinese naval and nuclear capabilities may be coming to an end in Washington.[27]

The lower level of India's emerging maritime nuclear capabilities is clearly not seen as a threat to the United States or the West. To be sure, those who view India's nuclear arsenal from the perspective of non-proliferation will have anxieties about its emerging maritime dimension. In terms of official policy, the United States civil nuclear initiative towards India, unveiled by George W. Bush in July 2005, is premised on two very different propositions. One is that India does not pose a nuclear or political threat to the United States. The other is that while the United States will not help advance India's military nuclear capabilities, it will facilitate civilian nuclear cooperation with India and step up conventional defence cooperation.[28] Despite many reservations among the Democrats, the Obama Administration

---

[25] Andrew S. Erickson and Lyle J. Goldstein, "China's Future Nuclear Submarine Force: Insights from Chinese Writings", *United States Naval War College Review*, Winter 2007, Vol. 60, No. 1, pp. 56-60.

[26] Andrew Erickson and Michael Chase, "An Undersea Deterrent?", *United States Naval Institute Proceedings,* Vol. 135, No. 6, pp. 36-41.

[27] For a comprehensive overview of the new American debate on Chinese maritime nuclear capabilities, see Andrew S. Erickson, Lyle J. Goldstein, William S. Murray and Andrew R. Wilson, eds., *China's Future Nuclear Submarine Force* (Annapolis, MD: The China Maritime Studies Institute and the United States Naval Institute Press, 2007).

[28] For a review of the origins of the India-United States nuclear deal, see, C. Raja Mohan, *Impossible Allies: Nuclear India, United States and the Global Order* (New Delhi: India Research Press, 2006).

has chosen to persist with the Bush logic of the civilian nuclear deal. What we do not know at this stage, is whether the rapid expansion of the Chinese nuclear capability will eventually result in United States assistance towards India's maritime nuclear project. Although the current global non-proliferation regime bars the United States from assisting the nuclear weapons programmes of other countries, it does not prohibit cooperation on military nuclear propulsion.[29] That is indeed the basis on which Russia has been cooperating with India on the non-explosive military uses of nuclear energy. There are no signs of this debate in Washington at this stage and nor is India seeking such cooperation. But as the Indian and American navies draw closer together in the Indian and Western Pacific oceans, the China factor is indeed an important driver.[30] It will be interesting to watch whether naval nuclear propulsion will emerge as a potential area of India's cooperation with the United States and other Western powers.

Meanwhile, the maturation of the Chinese maritime nuclear arsenal and successful inauguration of the India's naval nuclear project demand that Beijing and New Delhi begin a serious conversation of nuclear weapons issues. While China and India do discuss a range of contentious bilateral issues, the nuclear question is not one of them. China has tended to take a formalistic view that India is not a recognised nuclear weapon power and therefore Beijing has nothing to discuss except non-proliferation. India has been deeply concerned about Chinese nuclear cooperation with Pakistan in the past and Beijing's opposition to the United States-India civil nuclear initiative. China, on the other hand, has seen the United States-India nuclear rapprochement as driven by a shared agenda of limiting, if not containing Chinese power in Asia. Given the danger of letting these negative perceptions fester, Beijing and New Delhi must launch a comprehensive nuclear dialogue that will touch on all relevant issues, including the developments on the maritime domain.

oooOOOooo

[29] James Clay Moltz, "Closing the NPT loophole on exports of naval propulsion reactors", *The Nonproliferation Review*, Vol. 6, No.1, pp. 108-114.

[30] See for example, Lisa Curtis, "United States-India Relations: The China Factor", *Heritage Foundation Backgrounder*, No. 2209 (Washington, DC: November 25, 2008); Harsh V. Pant, "India in the Asia Pacific: Rising Ambitions with an eye on China", *Asia Pacific Review*, Vol. 14, No. 1, 2007, pp. 54-71; James R. Holmes and Toshi Yoshihara, "China and the United States in the Indian Ocean: An Emerging Strategic Triangle", *United States Naval War College Review*, Vol. 61, No.3, 2008, pp. 41-60.