



REPORT

Nuclear-armed submarines in Indo-Pacific Asia: Stabiliser or menace?

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September 2015

LOWY INSTITUTE
FOR INTERNATIONAL POLICY

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This paper is part of a wider research and outreach project on nuclear stability in a changing Indo-Pacific Asia, supported by a grant from the John D. and Catherine T. MacArthur Foundation.

EXECUTIVE SUMMARY

In their quest for regional security, rising powers China and India are seeking a powerful deterrent — nuclear weapons on submarines. In theory, this could reduce the risk of a major war in Indo-Pacific Asia, as no adversary would want to strike first against a country with so invulnerable a nuclear arsenal. Ballistic missile submarines are widely considered to have helped keep the peace during the Cold War, and continue to be the mainstay of US, Russian, French and British defence.

But stability in the new Indo-Pacific nuclear balance remains many years away, and will be precarious even if attained. There will likely be a long phase of initial instability as China and India start deploying nuclear missiles on submarines without the full command and communications systems, and the training and doctrine so vital to a secure and credible deterrent. Even after such infrastructure is in place, Chinese and Indian nuclear-armed submarines — along with possible Pakistani and North Korean units — may remain detectable by adversaries, making their activities unpredictable in times of crisis. Moreover, these supposedly stabilising new forces may worsen wider maritime tensions, as China and India seek to dominate local waters in an effort to turn them into 'bastions' for their nuclear-armed submarines.

The risks and uncertainties of strategic change in Indo-Pacific Asia are not limited to shifting relativities of conventional military power, diplomatic influence or economic weight. Nuclear weapons, those ultimate instruments of power from the 20th century, are also factors in today's Indo-Pacific strategic competition.¹ The regional contests for influence between the United States and China, and China and India, do not yet have the existential or ideological 'life-or-death' character of the Cold War. But quite literally below the surface, a new and dangerous competition is emerging as China and India in particular start deploying nuclear weapons at sea.

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Over the next decade, a number of sea-based nuclear weapon platforms in the Indo-Pacific will move from a testing and design phase, to active deployment. China has reportedly achieved the ability to conduct nuclear deterrent patrols — putting a nuclear-capable submarine to sea with the weapons on board — and India has launched its first nuclear ballistic missile submarine. Pakistan and North Korea are also pursuing a more rudimentary capability, which would involve diesel electric submarines carrying nuclear weapons.

Advocates of sea-based nuclear weapons see such fleets as providing stability because of their relative invulnerability to surprise attack. Ballistic missile-carrying nuclear submarines (SSBNs), in particular, are seen to provide a secure 'second-strike' capability, ensuring that nuclear deterrence is credible and thus helps prevent war. This was certainly the case during the Cold War. But what applied in the 20th century struggle between the West and the Soviet Union does not necessarily hold for the more complex strategic situation that is now evolving in Asia.

Indeed, even if sea-based nuclear weapons ultimately contribute to strategic stability in Asia, getting to such a situation will be far from straightforward. Whether the deployment of sea-based nuclear weapons brings stability or instability, will not be determined by these weapons alone. The interplay between the introduction of these weapons and existing regional tensions, notably over the South China Sea and the Bay of Bengal, will matter. The development of other capabilities like ballistic missile defence (BMD) and anti-submarine warfare (ASW) will also alter calculations. As India and China move ahead with their SSBN programs, issues such as command and control, nuclear doctrine, deterrence signalling and force posture will have to be addressed in order to maximise the chances that these platforms contribute to stability rather than promote instability. The possibility of Pakistan or North Korea also putting nuclear-armed vessels to sea adds a new and unpredictable dimension to regional security.

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This Report outlines some of the key risks and consequences associated with the proliferation of nuclear weapons at sea in the Indo-Pacific. It also considers what measures might be taken to help build a more stable deterrence structure in the region. These questions are addressed as part of a wider research and dialogue project, supported by the MacArthur Foundation. The Report draws on a workshop held in May 2014 that involved experts and former senior naval and military officers from China, India, the United States, the United Kingdom, France and Australia, as well as an online debate on the Lowy Institute's digital magazine, *The Interpreter*.² It focuses principally on the challenges and consequences arising from SSBN capabilities being developed by China and India, as these two major powers are considerably advanced in their pursuit of sea-based nuclear weapons. The maritime nuclear weapon ambitions of others, notably Pakistan and perhaps eventually North Korea, are cause for concern but more matters of speculation at this stage, so this Report does not examine or consider them in depth.³ Meanwhile, the existence of powerful US and Russian SSBN capabilities has long been a given in the global strategic equation, and are thoroughly analysed elsewhere — although it is worth emphasising that both these powers are modernising their forces.⁴

Nuclear deterrence does not exist in a vacuum. The deployment of nuclear weapons to sea by India and China will cause other powers in the region, including the United States and Japan, to change or bolster their conventional maritime capabilities. Thus the maritime nuclear programs of China and India are of particular regional and global importance, given that they may affect the nuclear *and* conventional strategic balance among major powers.

STRATEGIC STABILITY

The Indo-Pacific region is becoming the centre of gravity for global geopolitical competition and involves intersecting and sometimes clashing interests of no fewer than six nuclear-armed powers: the United States, China, Russia, India, Pakistan and North Korea. All are modernising their nuclear forces, and in the years and decades to come all may have nuclear-armed vessels operating under conditions of tension and mistrust in increasingly contested and congested waters.⁵ As a result, strategic stability, a concept developed during the Cold War, is gaining new relevance in the Indo-Pacific. Strategic stability is essentially about reducing the incentives for states to launch nuclear weapons first while increasing their confidence that they will be able to launch those weapons in retaliation should it be necessary.⁶

China and India, as the major regional powers in the Western Pacific and the Indian Ocean, respectively, are driving nuclear force modernisation across the region. Much of this is occurring on land, through long-range missiles. But, increasingly, modernisation is also

occurring through the development and deployment of sea-based nuclear weapons in ballistic missile submarines.

A simple way to understand the complex challenges and consequences of the region's new nuclear maritime geopolitics is in the form of a 'cascade effect'. The perceived asymmetries and responses in one nuclear deterrence relationship in the region have a cascading effect on others, both in terms of nuclear and conventional force postures. In particular, China is modernising its nuclear forces in response to the nuclear superiority of the United States. In turn, the United States is realigning its conventional maritime forces in the region in the face of China's growing nuclear and conventional capabilities. This dynamic then has a cascading effect on India, which is further modernising its nuclear arsenal, both on land and at sea, to offset what it sees as China's superior nuclear forces. Pakistan, meanwhile, is seeking nuclear capabilities to surmount both India's nuclear forces and larger conventional military.⁷ The security partnership between China and Pakistan intensifies India's determination to develop forces to counter them both.

In the nuclear and conventional maritime domain, this cascading effect is already apparent in the Indo-Pacific. On top of the technical and operational challenges that sea-based nuclear weapons bring to the regional order, they will have significant consequences for the way India, China and the United States invest in and deploy their conventional maritime forces in the region. In this way, US nuclear superiority over China does not matter as much as the way that US forces respond in the region to China's new nuclear maritime capabilities. This dynamic brings its own set of dangers and will need to be addressed if sea-based nuclear weapons are to contribute to strategic stability in the Indo-Pacific.

During the Cold War, the introduction of SSBNs was generally considered to have reduced the risk of nuclear war between the United States and the USSR. The Indo-Pacific does not possess the same existential or ideological confrontation of the Cold War, putting less day-to-day strain on the deterrence relationships in the region. But the possibility of security crises in the 21st century Indo-Pacific can hardly be dismissed. So it is worth considering whether lessons can be taken from the Cold War experience.

Initially, during the Cold War, technological limitations forced early SSBNs to patrol dangerously close to enemy coastlines.⁸ As one US admiral put it, the "vulnerability [of SSBNs was] ... that of a 'tethered goat'."⁹ However, once submarine-launched ballistic missiles (SLBMs) were developed with longer ranges, the relative invulnerability of SSBNs was increased. The first example of this was when US submarines acquired the Trident I missile in the late 1970s, which increased their patrol areas to tens of millions of square nautical miles.¹⁰ Once the

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USSR developed long-range SLBMs, they began to employ them under the polar ice or in heavily defended waters near their home ports: so-called 'bastions' where they were better protected from detection or attack.

A major milestone in the use of SSBNs was the concept and practice of 'continuous at sea deterrence' (CASD).¹¹ This involved keeping a rotation of nuclear-armed submarines on patrol, undetected and prepared for conflict, at all times — and signalling to potential adversaries that this was the case. In the words of a senior practitioner, former UK First Sea Lord Admiral Sir Mark Stanhope, this required credibility based on "a proven, assured capability underpinned by a clear declaratory policy."¹² He has described CASD as an underlying "feature of world order" which guards against the need for powerful countries to suddenly surge their nuclear readiness "at a time of growing crisis thereby aggravating and escalating an already tense diplomatic environment."¹³

One feature distinguishing the Cold War from the present is that the United States and USSR built their SSBNs in large numbers. In particular, this helped the Soviets compensate for their inferior, relatively detectable or noisy submarines, and helped ensure that if their SSBNs were attacked some would survive long enough to launch their weapons.¹⁴ So far in the Indo-Pacific regional powers are only seeking sea-based nuclear weapons and platforms in relatively small numbers.

NEW CAPABILITIES, NEW CHALLENGES

The lessons of the Cold War will inform the challenges China and India face as they introduce their new nuclear-armed submarine capabilities. Although both powers will strive to keep operational information about these assets deeply classified, a substantial amount of knowledge and informed speculation is available in the public domain, and can help an understanding of the risks and problems ahead. It is also worth briefly considering what future directions the other emerging nuclear powers in Asia such as Pakistan and North Korea might take with respect to putting nuclear weapons at sea.

CHINA

Although much of China's nuclear force modernisation has focused on improving the range, accuracy and mobility of its land-based missiles, enough effort and resources have gone into advancing the submarine force to suggest that China is getting serious about SSBNs; not just to give Beijing additional certainty that it could threaten or inflict massive damage in the case of a nuclear conflict, but also to improve its chances of penetrating US missile defences in any such conflict. A future generation of Chinese submarines, operating undetected in the open

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ocean, could challenge US missile defences by attacking from an unexpected launch azimuth from an unanticipated location.¹⁵

China has now progressed well beyond its first experiment in SSBN technology: the sole and ageing Type 092 or Xia-class boat that was designed in the 1970s, commissioned in the 1980s, and finally unveiled to the world in a 2009 international fleet review. Although considered exceptionally noisy and detectable, the Type 092 is widely thought to serve China principally as a technology demonstrator: it is believed never to have conducted a patrol with nuclear weapons on board.¹⁶

China is now concentrating on its successor, the Type 094 or Jin-class submarines, most of which are home ported at the Yulin Naval Base on Hainan Island in the South China Sea. The Pentagon considers this China's first "credible sea-based nuclear deterrent" and assesses four of these boats to be operational, with a fifth under construction, all to be equipped with up to twelve JL-2 SLBM, estimated to have a range of 7400 km — enough to reach US territory from the waters of the Western Pacific.¹⁷ Additionally, the Pentagon assesses that China is developing an improved third generation SSBN, the Type-096, to be fitted with a long-range missile, the JL-3, which could reach the United States from the waters of the South China Sea.¹⁸

What is not clear is when Chinese SSBNs will commence deterrence patrols with nuclear weapons on board. The Pentagon has previously projected that this turning point would occur in late 2014, but has revised that prediction to sometime in 2015.¹⁹ More broadly, China is showing increased seriousness about its ability to conduct prolonged submarine operations. Recent long-range patrols by Chinese nuclear submarines, notably in the Indian Ocean in 2013 and 2014, are signs that the People's Liberation Army Navy (PLAN) is testing the operational procedures and endurance of its crew on long-range submerged voyages such as those conducted by SSBNs.²⁰ Indeed, one US Navy Vice Admiral has said on the record that a Chinese SSBN has already conducted a 95-day patrol.²¹

China still has a way to go before it can boast a relatively invulnerable nuclear deterrent at sea: the Type 094 SSBN has been rated by the US Office of Naval Intelligence to be relatively noisy, and easier to detect than Russian SSBNs from the late 1970s.²² This would make the Type 094 vulnerable to detection and tracking, even more so given that the range of the JL-2 missile would require the boats to operate in the open ocean of the Pacific.²³ Still, in a future possible confrontation with India, the Type 094 would have the range to strike India from Chinese coastal waters.

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INDIA

India's nuclear forces are in the midst of extensive modernisation. Despite confident rhetoric about the quality of India's deterrent, it remains uncertain whether India has a reliable second-strike capability against its two potential adversaries, China and Pakistan. It is widely assumed that India's land-based missiles, often with shorter ranges, are intended to deter a nuclear-armed Pakistan, whereas the submarine program is aimed at giving India confidence that it will not be coerced by China. Some of India's land-based weapons, notably long-range variants of the Agni missile, are also believed to be designed to target China, but submarines will increase India's confidence that it could retaliate if struck first.

Test flights of Indian ballistic missiles are becoming commonplace. It is possible that in 2015 India will conduct the first test-firing of a ballistic missile — the B-05 or K-15 — from a submerged Indian submarine.²⁴ This would be the next step in advancing India's long-held ambition to achieve a 'triad' of land-, air- and sea-launched nuclear weapons. A previous milestone in this program was the launch in 2009 of New Delhi's first SSBN, the INS *Arihant*.²⁵ A second such submarine is being built — potentially to be put to sea within the next year or two — and a third and possibly fourth are also planned.²⁶ There are reports that in the medium term, an updated design is planned for India's fifth SSBN, which will be larger and contain a more powerful reactor, allowing longer-range patrols.²⁷

There are conflicting accounts of whether India intends the *Arihant* to be merely a technology demonstrator or an operational weapons-carrying platform. In 2010 Indian media reported the then Indian Naval Chief as suggesting that K-15 ballistic missiles would be paired with the vessel from about 2016.²⁸ However, there has been some speculation that since the vessel is partly based on the old Akula-class Soviet SSN, and because it is India's first indigenously designed nuclear submarine, its acoustic signature is not likely to be quieter than China's Jin-class boats. In other words, both India and China will initially have nuclear-armed submarines that are relatively easy for potential adversaries to track.²⁹

The shortcomings of the K-15 SLBM are a major limitation on India's sea-based nuclear deterrent. The range of the K-15 is believed to be just 750 km, meaning that Indian vessels would have to patrol dangerously close to the Chinese or Pakistani coasts.³⁰ In terms of India's deterrent against China, a vessel equipped with the K-15 would have to transit busy choke points such as the Straits of Malacca or Sunda and loiter off the Chinese coastline, thereby running a high risk of being detected by China's fast-improving surveillance and anti-access forces and being pre-emptively attacked in a crisis. The nature of the Soviet-designed nuclear reactor on board, with a short refuelling cycle, could also limit the length and frequency of patrols.³¹

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New Delhi is trying to address these shortcomings by developing submarine-launched missiles with longer ranges: the K-4 (3000 km range) underwent an undersea test launch (from a pontoon not a submarine) in early 2015 and the K-5 (5000 km range) is reportedly in the design phase.³² It is unclear whether these larger missiles would fit into the *Arihant* class, or whether they will only be compatible with an updated Indian SSBN design. It is possible that Indian submarines will end up carrying up to twelve K-15 missiles each, or a smaller number, perhaps four, of the long-range missiles.

OTHER POTENTIAL NUCLEAR PLAYERS – PAKISTAN

Pakistan has made strides towards establishing a sea-based second-strike capability over the last decade, but is significantly behind both China and India. Pakistan's program also seems to be based on short-range cruise missiles and diesel electric submarines, rather than SSBNs. It is clear that as India has developed its own sea-based deterrence capabilities, Islamabad has sought to "equalize its strategic relationship with its neighbour."³³ An authoritative account concludes that Islamabad is seeking a sea-based deterrent because of a combination of its perceived growing conventional military imbalance with India, a lack of strategic depth and a reliance on nuclear coercion.³⁴ India's continuing development of ballistic missile defence systems is also likely to be playing a role. The argument made by some analysts that Pakistan intends to base the nuclear-capable Babur cruise missile on submarines was bolstered earlier this year when Islamabad announced its intention to purchase eight Chinese-made diesel-electric submarines, most likely the Yuan-class.³⁵ If true, this would reinforce Indian concerns that China is deliberately helping Pakistan pose a nuclear threat to India.

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NORTH KOREA

North Korea has reportedly made some progress on both fitting a submarine with vertical launch tubes and testing a missile, which appears to place Pyongyang in the initial developmental stages of a sea-based deterrent. Independent analysts, as well as officials from the United States and South Korea, have reported on North Korea's advances in both submarine technology, as well as warhead miniaturisation and submersible missiles. In May 2015 North Korean state media publicised the apparently successful 'breaching' test of a submerged ballistic missile.³⁶ However, there is reason for a high degree of caution about these claims. Some reports suggest that North Korea faked the pictures of its missile test.³⁷ And it is far from clear whether North Korea has made the advances in guidance and targeting capabilities that are critical for at-sea ballistic missile operations. There is also evidence that the missile in question, a design based on the Soviet R-27 SLBM that was in service from 1968 to 1988, is liquid-fuelled, raising questions about its reliability.³⁸ While North Korea has invested

significantly in submarines, these have tended to be small, diesel boats based on old designs. Pyongyang is likely to be decades away from a reliable sea-based nuclear deterrent, but will no doubt continue to generate fear and uncertainty about its program.

A LOOMING ERA OF INSTABILITY

It is fair to assume that within the next decade, China and India will begin deterrent patrols at sea. Eventually, seaborne nuclear weapons might contribute to strategic stability in the Indo-Pacific in somewhat the same way they did so during the Cold War. But it will take time and much development of the technology and doctrine associated with these weapons to reach that point.

In the meantime, the proliferation of sea-launched nuclear weapons in the Indo-Pacific has the potential to aggravate instability among the region's nuclear powers. This will be a phase of heightened risk, worsened because of the interplay between the introduction of these weapons and existing maritime tensions. As the technical and operational experiences of the Cold War powers testifies, simply having and deploying nuclear-armed platforms at sea will not contribute to overall strategic stability. Communication systems, intelligence, command and control, crew training, clear doctrine and channels of diplomatic signalling during times of tension will all be needed to maximise stability. Until these systems are in place SSBNs could be a strategic liability, rather than a stabilising presence, particularly during conflict or crisis situations.³⁹

There are five key areas of risk associated with the proliferation of nuclear weapons in the Indo-Pacific region at this stage.

1. CHANGES TO EXISTING NUCLEAR POSTURE

Since their development, both India and China's land-based and airborne nuclear weapons have been kept in various states of disassembly. Particularly in India's case, multiple government agencies control separate elements of their land-based missile systems and associated warheads. However, nuclear deterrence patrols on an SSBN require the warheads, missiles and charges to be completely mated, ready to fire, in the submarine's launch tubes. This will elevate the nuclear strategic readiness of both nations and alter their nuclear force postures. A similar change occurred during the Cold War. Initially, in the Soviet Union, nuclear warheads were kept under KGB control and separate from delivery vehicles. This changed in the late 1960s when the USSR began deterrence patrols with SSBNs.⁴⁰ The consequence was a heightened Soviet nuclear force posture.⁴¹

There are signs that these changes may already be occurring in Indian and Chinese strategic forces. Currently, civilian agencies are reported to

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be in control of India's nuclear warheads and they are only handed over to the military "in the final stages of an ordered nuclear strike."⁴² With a commissioned SSBN force, however, the navy would gain full 'operational control' of Indian nuclear weapons, perhaps opening the way to direct military control of other armaments in the nuclear triad.⁴³ In the case of China, the PLA's Second Artillery Corps have traditionally been the keepers of the country's nuclear arsenal.⁴⁴ Chinese SSBNs on active deterrence patrol will require the PLAN to exercise a certain amount of control over the country's nuclear weapons, a significant organisational change in the way China's nuclear weapons are handled. The technological and engineering necessity of having fully mated nuclear ballistic missiles on Chinese and Indian submarines also raises important questions for crisis stability in the Indo-Pacific: will future crises have a higher degree of instability due to fully mated nuclear weapons being present in the region?

2. UNDERDEVELOPED COMMAND AND CONTROL ARRANGEMENTS

Credible SSBN forces place huge demands on command structures. Survivable communications between SSBNs at sea and national command authorities are critical to their ability to provide a credible deterrent.⁴⁵ During the Cold War, both superpowers put large resources into ensuring that communication with their SSBNs were reliable and secure.⁴⁶ Communication with submarines is complicated by the physical limitations of transmitting signals through water.⁴⁷ Most countries that operate SSBNs currently do so primarily through very low frequency (VLF) communication, which requires large vertical transmitter stations. Extremely low frequency (ELF) systems can also be used to reach submarines patrolling in deep waters, directing them to rise to VLF depth for further instructions.

Despite indications that China and India have been investing in the technology and infrastructure necessary to communicate with their SSBNs, there is little evidence that they have built survivable or reliable systems. Information on China's VLF capability is sparse, but there are reports that China achieved a level of capability in the early 1980s, and that it has constructed several VLF transmission stations along the Chinese coastline.⁴⁸ There is evidence in Chinese technical journals of continuing research into VLF and ELF technology.⁴⁹ New Delhi has stepped up its submarine communication capability in the last several years,⁵⁰ establishing a new VLF facility, INS Kattabomman, in the country's south.⁵¹ However, neither China nor India seems to have created the type of airborne systems for communicating with submarines that are seen by observers as necessary for undertaking credible deterrence patrols.⁵²

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New Chinese and Indian SSBNs will need to operate under command and control procedures that are new to the Chinese and Indian navies. Their crews will not have much experience of long-range and extended patrols without direct and constant communication with national command authorities. As these countries learn to operate their new SSBNs there will be risks of miscommunication and even of inadvertent escalation.

3. INCIDENTS AT SEA

The development of Chinese and Indian SSBN forces will also compel others to respond, shaking up conventional force postures in the Indo-Pacific in ways that may inadvertently heighten regional tensions. The emergence of sea-based nuclear weapons and the proliferation of conventional submarines in the Indo-Pacific is already changing the way the United States, China, India, Japan and others are investing in conventional maritime forces, as well as where and how they are being deployed. In particular, the United States, China, India, Japan and other powers are investing anew in anti-submarine warfare.

The most effective tool in anti-submarine warfare is another submarine. Already the region is seeing a proliferation in conventional submarines for a variety of reasons, including the advantages that submarines bring in intelligence gathering, land attack, and the interdiction of shipping.⁵³ As the Chinese and Indian SSBN programs advance, and as Pakistan and North Korea consider their own more rudimentary seaborne nuclear plans, the proliferation of conventional submarines is likely to accelerate. As more countries deploy submarines and other conventional forces capable of tracking SSBNs in the region, the greater the potential for unplanned encounters and incidents between these forces.

These risks are particularly acute in the subsurface domain. Collisions and near misses occurred many times in the Cold War, particularly during the early phases of Soviet SSBN deployments, when on at least three occasions in 1970 alone US submarines collided with the Soviets they were trailing.⁵⁴ Unofficial sources place the number of such collisions between SSBNs and their tailing submarines as high as 20 to 40.⁵⁵ Dangerous submarine incidents can occur even among allies in the post-Cold War world, as shown by a potentially disastrous crash between British and French nuclear-armed boats in 2009.⁵⁶ With the number of submarines operating in the Indo-Pacific growing, particularly around choke points, the chances of such encounters will increase.⁵⁷ As the commander of US submarines in the Pacific, Rear Admiral Phillip Sawyer has noted, “the more submarines you put in the same body of water, the higher the probability that they might collide.”⁵⁸

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4. CONVENTIONAL ARMS RACES AND MARITIME TENSIONS

There are already some signs that the development of SSBNs is contributing to maritime tensions and this may accelerate in the future. One thesis for China's growing assertiveness and construction activity in the South China Sea is that they are preparing to use this territory as a bastion for their SSBN fleet. Former Japanese Admirals are among the strongest proponents of the view that China's 'covert purpose' in trying to eject US surveillance from the South China Sea is to be able to deploy SSBNs undetected into the Pacific in order to hold US cities at risk during a crisis.⁵⁹ One advantage China could draw from its recent building of islands in the South China Sea is that these could help expand the infrastructure of its submarine detection or Sound Surveillance System (SOSUS) network of hydrophone arrays. There is evidence that China has built SOSUS networks around some of its major naval bases, such as those around Hainan Island, which would suggest that the PLAN is working towards a more comprehensive surveillance and ASW capability.⁶⁰ The extension of this system and capability to islands in the South China Sea would give the PLAN the ability to conduct passive acoustic monitoring of large swathes of the region. This, along with any further militarisation of the islands themselves, such as the installation of radar and anti-air infrastructure, would allow Beijing to establish a working 'bastion' for its SSBNs. China may also be seeking to disrupt the US and Japanese surveillance effort in the East and South China Seas, through deliberate encounters or challenges involving ships and aircraft as well as through the enforcement of a new Air Defence Identification Zone.

One of the advantages in establishing the undersea 'third leg' of a nuclear triad is that it complicates the deterrence calculations of adversaries, compelling them to invest heavily in tracking and defending against SSBNs.⁶¹ For example, even a few operational Chinese SSBNs would "compel the U.S. to plan for a theoretical Chinese nuclear-missile strike from the sea."⁶² This would affect how the United States deploys its fleet⁶³ and plans for its defences against ballistic missiles. In time, this will likely hold true also for India and — against Indian SSBN forces — for China. This is an example of the 'cascading' effect that SSBNs will have on both the Indo-Pacific region's nuclear posture and conventional force deployment. China's coming SSBN deployment may even give more impetus for continued investment in BMD throughout the region.

This raises the prospect that strategic anti-submarine warfare — finding, tracking, countering and if need be destroying SSBNs — will become a heightened priority for conventional maritime forces.⁶⁴ It is even likely that naval nuclear tensions between India and China will arise from their efforts to protect their respective nuclear bastions in the Bay of Bengal and in the South China Sea.⁶⁵ To be able to strike Chinese territory, Indian SSBNs — even with their eventual longer-range K-4 missiles — could well end up patrolling in the Bay of Bengal, under the watch of

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Indian surface and coastal forces. China would face great difficulty in bringing its surface and air ASW forces to the Bay of Bengal to trail Indian SSBNs so close to India. However, China could still attempt to deploy nuclear attack submarines into the Indian Ocean to sow doubts in Indian minds about the survivability of their nuclear deterrent. This may be one of the purposes of China's experimentation with such deployments in recent years.⁶⁶

Much of the risk inherent around the proliferation of nuclear weapons at sea in the Indo-Pacific will depend on whether the Chinese and Indian governments choose to deploy their undersea nuclear forces prematurely. Given the scale of investment going into these programs, and the intense national pride and prestige attached to such iconic great-power weapons, naval commanders may be reluctant to underscore to their political masters the true limitations of their nascent SSBN assets. The limited ranges of Chinese and Indian sea-launched missiles could tempt their governments to risk deploying these assets into waters where their own surface and surveillance forces do not have significant control. Such premature deployment could be conducted during times of tension, as coercive or defensive signals or to bolster substantive deterrence. This would be particularly hazardous if such steps were taken before the human and technical infrastructure necessary for secure and credible SSBN operations was in place.

5. THE POSSIBILITY OF RAPID ESCALATION

The relatively underdeveloped state of Chinese SSBNs also poses a risk in the unlikely event of conventional conflict between China and the United States in the near future. Some aspects of both US and Chinese strategies for major conventional conflict might inadvertently raise the risks of escalation to the use of nuclear weapons.

The Air-Sea Battle concept, now the Joint Concept for Access and Maneuver in the Global Commons, was designed to ensure access for US expeditionary forces to areas contested by China's anti-access and area-denial capabilities.⁶⁷ The concept calls for the integration of "air, maritime, land, space and cyberspace" domains in order to "disrupt, destroy and defeat" the enemy. However, the primary way that the concept seeks to accomplish this mission is through the disruption of "command, control, communication, computers, intelligence, surveillance and reconnaissance" systems in a "blinding" campaign. The plan calls for strikes on "softer targets" as well as at "the web of networks and satellites" controlling the enemy's communications and other weaponry.⁶⁸

Similar Chinese doctrines and strategies for conventional war could also be dangerously escalatory in the nuclear domain. For example, as laid out in the 2013 edition of *The Science of Military Strategy*, the PLA places significant weight on maintaining "strategic information

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superiority” by conducting “soft damage or hard destruction through cyber attacks inflicted upon the infrastructure and fundamental information resources ... which a country’s armed forces depend upon.”⁶⁹ In a similar fashion to the concept of ASB, this information warfare is designed to disrupt the command and control of forces on the battlefield, and likely also includes submarines.

What is not clear about either of these doctrines is whether there are any plans for discrimination between communication networks and satellites that are integral for communication with nuclear forces, particularly SSBNs at sea. The result of such a strategy might be ‘virtual decapitation’, whereby communication is broken between national command authorities and strategic forces through a combination of cyber and conventional attack.⁷⁰ For instance, during a conflict the United States might be tempted to launch a ‘blinding’ campaign on Chinese communication networks involving strikes against VLF communication nodes in an attempt to cut communication between the PLAN military leadership and Chinese nuclear attack submarines, resulting in disrupted communications with deployed Chinese SSBNs as well.

This theoretical loss of communication would put more pressure on the underdeveloped command and control arrangements of India and China’s SSBNs. Related to questions about reliable communications is the critical issue of who controls the nuclear weapons on board. Permissive action links (PAL), locking systems designed to prevent the unauthorised launch of nuclear weapons by physically separating nuclear launch codes from the weapons, would need to be installed on Indian and Chinese SSBNs.⁷¹ It is still unclear what progress India or China has made on these.⁷²

There is also the issue of direct attacks on SSBNs in any conventional conflict. The best-case scenario for a conventional conflict, particularly involving a country with a low number of vulnerable SSBNs, would be for the attacker to implement a discrimination strategy. This would call for the country with the ASW advantage to avoid destroying the other country’s SSBNs in an effort to maintain strategic stability and to prevent a ‘use it or lose it’ dynamic. This was a major criticism of the US maritime strategies in the later phases of the Cold War that involved US attack submarines surging into Soviet SSBN bastions.⁷³ This is not just an issue for the United States and China. These same risks will exist when India and China commence their first deterrence patrols over the next several years. During any conventional conflict in the Indo-Pacific, SSBNs could be targeted and destroyed out of self-defence by attack submarines, raising the possibility of inadvertent escalation.

...this information warfare is designed to disrupt the command and control of forces on the battlefield, and likely also includes submarines.

A LONG-TERM STABILISER?

Not everything in geopolitics gets worse all the time. Assuming that lessons are learned and potential crises managed in the decade ahead, advances in Chinese and Indian SSBN and SLBM technology may eventually contribute to a new phase of relative strategic stability where the existence of nuclear weapons keeps the peace and prevents their use. Strategic stability also means minimising the risk that nuclear weapons will be used by accident or without authorisation.⁷⁴ The achievement of strategic stability during the Cold War was, however, hardly a forgone conclusion. It required evolutions in technology, posture and doctrine, but also witnessed moments of near catastrophe, notably the 1962 Cuban Missile Crisis, in which a Soviet submarine commander's preparations to launch a nuclear torpedo could have been the opening shot in a global nuclear war.⁷⁵

A number of technological milestones will need to be achieved by India, China and other prospective nuclear players to reach this stage. In particular, Chinese and Indian nuclear-armed submarines will need to make substantial progress in quieting their engines and overall acoustic signatures — to ensure that they remain a credible, and hence stabilising, deterrent for both countries. Quiet submarines will strengthen the credibility of their second strike capability, allowing Indian and Chinese SSBNs to survive in their respective coastal waters, even in the unlikely event of a devastating first strike against their home ports. Similarly, longer-range SLBMs would allow China and India to establish credible and assured nuclear triads that would contribute to strategic stability rather than drive strategic uncertainty. The still-in-development K-4 SLBM will allow Indian SSBNs to provide a credible sea-based deterrent against China from the Bay of Bengal, without it having to transition through the Strait of Malacca or patrol near Chinese waters. Once China's SSBNs become operational they will have a second-strike capability against India, although they will not have one against the continental United States. The JL-3, China's next generation SLBM, will likely have the range to perform a second-strike role against the United States, but there are few reports on what progress China has made on the missile.⁷⁶

One complicating factor in the development of a stable deterrence structure is the growing number of BMD programs in the region. The United States (and Japan), as well as China and India, all have BMD programs in various stages of development, with the United States widely considered to be far ahead.⁷⁷ Such programs can be an obstacle to achieving strategic stability by limiting the ability of a state to retaliate after suffering a first strike.⁷⁸ This can be especially true if BMD is used in conjunction with ASW, where the patrolling of SSBNs can be contained to a specific geographic location thereby allowing missile defences to operate more effectively.⁷⁹ For instance, if Chinese SSBNs are loud enough to be found, US or allied surface ships with anti-ballistic

Quiet submarines will strengthen the credibility of their second-strike capability, allowing Indian and Chinese SSBNs to survive in their respective coastal waters...

missile capabilities could be forward deployed in order to detect and track SLBMs from launch and thus help ensure their interception, creating potential pressures on political leaders to either order an attack on the surface ships or have their SSBNs launch their missiles before they are found.⁸⁰

Another reason that the possible stability brought by SSBNs could prove short-lived is the potential for disruptive leaps in technology to detect submarines. Scientific advances in quantum computing and unmanned systems could make submarines easier to find, even if the prospect of absolute transparency of the oceans remains elusive. Alternatives to 20th century sonar have existed in theory for some time — such as the ability to detect submarine movements through the movement of water that their wake produces — but the necessary computing power needed to run “oceanographic models in real time” has been out of reach.⁸¹ But with the continued enhancement and miniaturisation of computer processing, the capability to use new sensor methods to track submarine movements could eventually be available on board ships, aircraft, UUVs and deployable systems placed on the sea floor.⁸² Small, autonomous sensory vehicles could be spread out across choke points and littorals to detect submarines.⁸³ Submarines would not become obsolete (not least because they themselves could carry the new technologies to detect other submarines) but would need to be deployed with greater caution, and assumptions about the invulnerability of SSBNs might need to be reviewed.⁸⁴

Submarines would not become obsolete...but would need to be deployed with greater caution.

MINIMISING RISK

There are number of steps that could be taken to help reduce the risks associated with the introduction of sea-based nuclear weapons in the Indo-Pacific while the technology and doctrine associated with these weapons matures.

Exchanges with established nuclear powers: The United Kingdom and France operate SSBN fleets of a similar size and disposition to those that might eventually be built by China and India. Both operate a small number of SSBNs with highly professional crews and command systems in place. The nuclear readiness that France and the United Kingdom have achieved involves an exceptional standard of human and technical infrastructure that took decades to develop. China and India could learn from the experience of these countries. Russian involvement might be an important added confidence-building measure given that both the United Kingdom and France are seen as allies of the United States. Any dialogue would, however, need to be conducted in a way that is neither patronising towards the emerging powers nor seen as a ploy to limit the size of their nuclear fleets. The United States and its allies in the Indo-Pacific would also be acutely sensitive to any dialogue or information sharing that, while aiding regional stability, might also improve China's

nuclear capabilities. Even so, a regular meeting at the unofficial or second track level, involving former naval practitioners, defence planners and technical specialists, could eventually evolve into a carefully managed formal dialogue on the stable, responsible introduction of seaborne nuclear weapons into the region.

Confidence-building measures: The whole character and advantage of submarines is their secrecy, so it would seem odd to recommend transparency and confidence-building measures around SSBN programs. However, there is an emerging recognition of the need for navies to at least begin testing the waters on this front, given the risks of unexpected encounters or even collisions in an increasingly crowded undersea security environment. Singapore has recently called for discussion on regional confidence-building measures for submarines in general.⁸⁵ This initiative is worth wider support, including from countries such as Australia and Indonesia, bearing in mind that much of the trouble could occur in the regional waterways on which their security depends. It could be pursued through mechanisms that involve many regional powers including China and India. A logical structure would be the ASEAN Defence Ministers' Meeting Plus, which parallels the East Asia Summit in including China, India, Japan, the United States, Russia, South Korea, Australia, New Zealand and the 10 Southeast Asia countries.

...much of the trouble could occur in the regional waterways on which [Australia's and Indonesia's] security depends.

China–India maritime security dialogue: As China and India increase their ocean-going naval capabilities and move to the operational deployment of nuclear-armed submarines, the time is ripe for them to begin a serious maritime security dialogue. A general maritime security dialogue between the two powers has been announced more than once in recent years, but has not yet convened. When it does eventually convene, it will be an opportunity for the two countries to discuss their nascent SSBN programs and to minimise risks and potential misunderstandings about the operation of their respective fleets.

US–China strategic stability dialogue: Such a dialogue has been called for repeatedly at least since the 2010 US Nuclear Posture Review obliquely acknowledged a degree of emerging mutual vulnerability to each other's nuclear weapons. Sooner or later, both powers will need to pursue such dialogue in earnest. China's SSBN program, as well as any US and allied efforts to counter it, will need to be part of the discussion. Some of these issues may need to be addressed initially through unofficial or second track dialogues. It will be important for both sides to send clear messages about nuclear doctrine, targeting, and the way the introduction of Chinese SSBNs could change US and Chinese naval operations. This could help ensure the stable management of future crises or incidents.

CONCLUSION

Not merely drowned relics of the Cold War, sea-launched nuclear weapons are becoming a reality in the Indo-Pacific. This new reality is multipolar and complicated, with China and India striving to achieve second-strike capabilities, Pakistan and North Korea making gradual but slow steps towards putting nuclear weapons at sea, and other powers in the region such as the United States adjusting its own force posture in response. As these different powers progress down these paths, it is clear that the maritime spaces of the Indo-Pacific will have an added nuclear dimension that may interact with conventional military forces in unexpected and dangerous ways. A realistic goal is not to stop or reverse this trajectory, but rather to find ways to limit and manage it, and ensure that these fearsome armaments strengthen rather than undermine peace and stability in the region.

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