

ISKANDER REHMAN

# MURKY WATERS

NAVAL NUCLEAR  
DYNAMICS IN THE  
INDIAN OCEAN



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Carnegie Endowment for International Peace  
Publications Department  
1779 Massachusetts Avenue, NW  
Washington, DC 20036  
P: +1 202 483 7600  
F: +1 202 483 1840  
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# ABOUT THE AUTHOR

**ISKANDER REHMAN** is currently a nonresident fellow in the South Asia Program at the Atlantic Council. Prior to joining the Council, he was a research fellow at the Center for Strategic and Budgetary Assessments, where he focused on U.S. grand strategy, Asian defense issues, and emerging security challenges in the Indo-Pacific. From July 2012 to July 2013, Rehman was a Stanton Fellow in the Nuclear Policy Program at the Carnegie Endowment for International Peace. A Franco-British citizen, Rehman has lived and worked in France, India, and the United States. He holds a doctorate in political science, with a specialization in Asian studies, as well as master's degrees in political science and comparative politics, from the Institute of Political Studies in Paris (Sciences Po).



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# SUMMARY

**MORE THAN FIVE YEARS** have passed since India launched its first ballistic missile submarine (SSBN) in July 2009. Meanwhile, Pakistan formally inaugurated a Naval Strategic Force Command headquarters in 2012 and has declared its intent to develop its own sea-based deterrent. As India and Pakistan develop their naval nuclear forces, they will enter increasingly murky waters. By further institutionalizing relations between their navies and by insisting on stronger transparency with regard to naval nuclear developments, both countries may succeed in adding a greater degree of stability to what otherwise promises to be a dangerously volatile maritime environment.

## ONGOING NAVAL NUCLEAR DYNAMICS IN SOUTH ASIA

- India's pursuit of a sea-based nuclear strike force is the next logical step in its quest for an assured retaliatory capability.
- India has conducted a series of test firings of Dhanush-class short-range ballistic missiles from offshore patrol vessels. It appears that for the Indian Navy, the Dhanush program is a stopgap measure until the SSBN fleet comes to fruition.
- The submarine-based leg of India's nuclear triad will have a major impact on the nation's existing command-and-control arrangements.

- To enjoy an effective sea-based deterrent vis-à-vis China, India's other prospective nuclear adversary, New Delhi has to develop larger SSBNs with greater missile carriage capacity and more powerful nuclear reactors.
- Pakistan's naval nuclear ambitions are fueled primarily by the sense of a growing conventional, rather than strategic, imbalance between New Delhi and Islamabad.
- By dispersing low-yield nuclear weapons across a variety of naval platforms, Islamabad aims to acquire escalation dominance and greater strategic depth and to reduce the incentives for a preemptive strike on its nuclear assets.

## **TAKEAWAYS FOR INDIA AND PAKISTAN**

- Naval nuclear operations during the Cold War hold an immense value in terms of thinking more deeply about issues such as conventional operations under a nuclear shadow, naval nuclear signaling, and escalation control.
- In order to avert misunderstanding, India's nuclear management would gain from clearer communication and greater transparency, particularly with regard to the Dhanush program.
- As Pakistan seeks to nuclearize its fleet, it will encounter a number of challenges. Chinese assistance could provide a way for Islamabad to more rapidly alleviate some of these difficulties. Considering the potential risks, however, Beijing may wish to maintain a greater distance from Pakistan's military nuclear enterprise.
- Over the past decade, India's and Pakistan's coast guards have enacted a number of confidence-building measures. Going forward, decisionmakers in New Delhi and Islamabad might consider extending initiatives to their navies as well.

# INTRODUCTION

**FOR MUCH OF** its modern history, the Indian Ocean has been remarkably free of naval nuclear friction.<sup>1</sup> Even during the second half of the Cold War, when both the United States and the Soviet Union expanded their military presence throughout the region, the bulk of their naval nuclear interactions occurred elsewhere, in the heavily patrolled Gulf of Finland or in the frigid waters of the Sea of Okhotsk.<sup>2</sup>

South Asian military competition, for its part, has traditionally been primarily a terrestrial, rather than a maritime phenomenon. For over a decade following India's and Pakistan's

decisions to burst out of the nuclear closet in 1998 and reveal their previously recessed capabilities to the world, the evolution of both nations' respective arsenals appeared to reflect these continental proclivities.<sup>3</sup> Although it was common knowledge that India had

initiated a nuclear submarine program some time in the 1970s, foreign analysts' attention remained squarely focused on the air- and land-based components of the subcontinental nuclear equation.

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In July 2009, India launched its first ballistic missile submarine (SSBN), the Advanced Technology Vessel (ATV), or S-2. Subsequently named the INS *Arihant*, the submarine's nuclear reactor went critical in August 2013, and in 2014 it was announced that a second SSBN would be launched some time soon.<sup>4</sup>

Meanwhile, Pakistan formally inaugurated a Naval Strategic Force Command headquarters in 2012 and has declared its intent to develop its own sea-based deterrent. Unlike their Indian counterparts, Pakistani security managers appear to have opted for a more unconventional naval nuclear force structure, strongly emphasizing dual-use platforms and strategic ambiguity.

Barring a few notable exceptions, commentary on these developments has been sparse and sporadic.<sup>5</sup> This continued intellectual neglect is puzzling, considering the fact that the maritime space constitutes the only medium in which South Asian nuclear platforms are likely to find themselves in frequent interaction.

This study seeks, therefore, to raise awareness on an issue that is destined to become of great importance, not only to those who closely follow security issues in South Asia, but also to all those with an interest in the fascinating—and often troubling—intersections of naval and nuclear strategy. In particular, it seeks to explore how naval nuclear interactions might lead to friction, misperception, and escalation—and what can be done to prevent or forestall such developments.

The report is divided into three main sections. The first section engages in a granular analysis of South Asia's current naval nuclear developments, describing the motivations and aspirations of both actors, as well as the current limitations to these same ambitions. The report then draws on the history of naval nuclear operations during the Cold War before detailing how some of the debates and discussions held during that rich and variegated period in history could potentially apply to contemporary South Asia. Notwithstanding the reflexive skepticism of many in New Delhi and Islamabad, the intellectual contortions of previous generations of nuclear strategists hold an immense value in terms of thinking more deeply about issues as complex as conventional operations under a nuclear shadow, naval nuclear signaling, and escalation control.<sup>6</sup>

The third and final section of the report explores the clouded future of naval nuclear dynamics in the Indian Ocean. Beijing might come to play a more important role, both as an enabler for Pakistani naval nuclearization and as a naval nuclear actor in its own right. Finally, ongoing technological developments in anti-submarine warfare (ASW) might have a sizable impact on sea-based deterrence and naval crisis stability in the region.

As India and Pakistan develop their naval nuclear deterrents, they will enter increasingly murky waters. By further institutionalizing relations between both navies and by insisting on stronger transparency with regard to naval nuclear developments, both countries may succeed in adding a greater degree of stability to what otherwise promises to be a dangerously volatile maritime environment.



# SOUTH ASIA'S HETEROGENEOUS NAVAL NUCLEAR DEVELOPMENTS

**INDIA'S AND PAKISTAN'S** quests for sea-based nuclear capabilities have been motivated by different strategic premises, with an assortment of distinct objectives in mind.

Since the beginning of the atomic age, the quest for a nuclear deterrent has frequently been viewed as an imperative for middle powers facing prospective adversaries armed with vast nuclear or conventional superiority.<sup>7</sup> In India's and Pakistan's cases, a feeling of conventional asymmetry combined with a strong threat perception act as the main drivers of their decisions to acquire a nuclear capability. In both nations, watershed moments helped give birth to a strong consensus among national decisionmakers around the strategic utility of nuclear weapons. New Delhi's primary concern was China, which had inflicted a humiliating defeat on India's ill-equipped and poorly prepared troops along the rugged Sino-Indian border in 1962. For Islamabad, the existential threat was India, particularly after the Indo-Pakistani war of 1971, which led to the amputation of Pakistan's eastern wing and the creation of the independent state of Bangladesh.<sup>8</sup>

While New Delhi's and Islamabad's quests for a nuclear triad can be understood through the lens of traditional nuclear deterrence, there are also other, more complex factors to take into account. India's pursuit of a sea-based strike capability is the next logical step in the formulation of its nuclear triad, but Pakistan's motivations are more complex and should not be perceived solely as reactive.



## INDIA'S FITFUL QUEST FOR A NUCLEAR TRIAD

### Sea-Based Nuclear Strike and Assured Retaliation

Shortly after India's Pokhran-II series of nuclear tests in 1998, the Indian government announced that its future minimum nuclear deterrent would be structured around a triad composed of mobile land-based missiles, aircraft, and naval assets.<sup>9</sup>

Having officially adopted a posture of no first use and assured retaliation, India considered it essential to acquire a capacity for continuous at-sea nuclear deterrence (CASD) to ensure the survivability of its nuclear second-strike capability. The importance attached to sea-based deterrence in India's nuclear posture has been repeatedly emphasized over the past decade, whether via the Standing Committee on Defense of the Lok Sabha (the Indian Parliament's lower chamber), or in the Indian Navy's maritime strategy and successive iterations of its Maritime Doctrine in 2004 and 2009.<sup>10</sup>

One can clearly detect a bureaucratic rationale behind the Indian Navy's continued emphasis of the indispensability of its nuclear role, alongside that of the historically privileged army and air force, as well as a quest for prestige.<sup>11</sup> This is made evident in the 2004 Maritime Doctrine, which states that, among no-first-use nuclear powers, "India stands out alone as being devoid of a credible nuclear triad."<sup>12</sup> In August 2013, shortly after the S-2's nuclear reactor went critical, then prime minister Manmohan Singh relayed a strong and widely held sense of national pride at such an accomplishment, declaring that

today's development represents a giant stride in the progress of our indigenous technological capabilities. It is testimony to the ability of our scientists, technologists and defense personnel to work together for mastering complex technologies in the service of our nation's security.<sup>13</sup>

Beyond the totemic significance of the *Arihant*, however, are powerful practical arguments in favor of India's deployment of nuclear-armed submarines. Placing nuclear assets at sea puts them at a safer distance from a so-called "splendid" first strike, and their mobility and discretion (in the case of a nuclear submarine) provide a greater measure of survivability.<sup>14</sup>

Unlike the United States and the Soviet Union during the Cold War, whose strategic centers were separated by great distances, India is caught in between two prospective nuclear adversaries. The flight time of an incoming short-range ballistic missile launched from Pakistan toward an Indian metropolis, such as New Delhi or Mumbai, is estimated to be a couple of minutes, at the most.<sup>15</sup> This deprives India of a crucial element in the event of a nuclear crisis—time to avert a crippling first strike. Furthermore, the increased militarization of the Chinese-controlled Tibet Autonomous Region and the proliferation of ballistic missile silos at strategically placed high-altitude vantage points along the long

Sino-Indian border pose potential threats to the survivability of India's land- and air-based deterrent, which could be substantially weakened under a protracted missile saturation campaign.<sup>16</sup>

Indian strategists frequently draw attention to China's recent advances in space-based surveillance, depicting them as a growing threat to the survivability of India's land-based arsenal. For example, Verghese Koithara, a retired Indian vice admiral, notes that

in China, India has an adversary that has considerable and fast improving space capabilities. Over the next two decades, its ability to zero in on India's siloes, and track and target its mobile forces could become considerable.<sup>17</sup>

This reasoning is shared by Arun Prakash, a former chief of naval staff and one of India's most respected thinkers on maritime issues:

Given the kind of transparency provided by satellites and other technical means, no air base or missile site—fixed or mobile—can remain hidden for long and will eventually figure on an enemy target list. The best way for India to provide invulnerability to its deterrent is to remove it from the enemy's scrutiny and send it underwater, on an SSBN. Once the submarine dives into the deep waters of the open ocean it becomes virtually impossible to locate or attack.<sup>18</sup>

Some Indian Navy officers have also opined that developing the sea-based leg could, in fact, prove more cost-effective in the long run, as deterrence would become less dependent on the size of the Indian arsenal and more on its invisibility from detection.<sup>19</sup>

Indian decisionmakers have long understood the rationale behind an undersea deterrent, and initiated the ATV program some time in the 1970s. In 2012, a report on Indian grand strategy penned by a group of esteemed Indian strategists argued that

the pursuit and maintenance of nuclear capability has been integral to India's quest for strategic autonomy since independence. . . . In the absence of a credible nuclear deterrent, India would have few options when confronted with adversaries possessing nuclear weapons. . . . Our main effort must be devoted to the maritime leg of our nuclear capability and the accompanying command and control systems.<sup>20</sup>

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**Unlike the United States and the Soviet Union during the Cold War, whose strategic centers were separated by great distances, India is caught in between two prospective nuclear adversaries.**

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## A Long and Painful Gestation

Bureaucratic languor, technical challenges, and chronic difficulties in nuclear reactor miniaturization ensured that progress would be painstakingly slow. For some skeptically minded observers, it became uncertain whether the \$2.9 billion project would ever come to fruition.<sup>21</sup>

From 1988 to 1991, Indian mariners gained a measure of experience in the operation of a nuclear vessel when New Delhi leased a Charlie-class conventional attack submarine (SSN) from the Soviet Union. It has also been reported that the ATV project heavily benefited from Russian expertise during the design phase.<sup>22</sup>

With the benefit of this technological know-how, and a renewed impetus after the overt nuclearization of the subcontinent in 1998, the *Arihant* was finally launched, with much publicity, in 2009. The *Arihant* is destined to be the first vessel in a flotilla of up to five indigenously produced SSBNs, and the Indian press reported in 2014 that a sister vessel at the classified Ship Building Center in Visakhapatnam was nearing completion.<sup>23</sup> The second SSBN, INS *Aridhaman*, should be launched in 2015 or 2016, by which time India may have also acquired a second Akula-II-class SSN from Russia.<sup>24</sup>

According to Raja Menon, a retired rear admiral in the Indian Navy, there has been a certain amount of intra-service discord surrounding the ATV project from its inception, and some naval officers had initially hoped that India would focus on indigenously developing a hunter-killer SSN rather than an SSBN.<sup>25</sup> Revealingly, when the Indian press announced the beginning of construction on the INS *Aridhaman*, navy sources were quoted as saying that “the focus must also shift to surface vessels.”<sup>26</sup>

Such intra-service disputes are nothing new and are hardly specific to the Indian Navy. After all, when the U.S. Navy initiated the Polaris submarine-launched ballistic missile (SLBM) program in the mid-1950s, many in the navy hierarchy were hostile to what they viewed as a potential diversion of funds away from the surface fleet.<sup>27</sup> Similar problems were encountered within the British Navy. Referring explicitly to the British Polaris program as a cautionary tale, one of India’s former chiefs of naval staff stressed the importance of strictly disaggregating the funding of the nuclear and conventional components of India’s fleet:

The funding of such a massive strategic project (for a continuous at-sea strike capability) must remain outside the Indian Navy’s budget. We all know what happened to the Royal Navy after the British government opted for the Polaris-Trident program in the sixties. These strategic assets are created by the nation for a specific strategic purpose (only as a nuclear deterrent), but need to be assigned to the armed forces for operational management. For this reason, the sea-based deterrent project will be operationally managed by the IN [Indian Navy], but funded

separately, and just cannot be part of the normally allocated budget of the IN. While a nuclear deterrent is a good bargaining chip, what really matters is conventional deterrence at sea.<sup>28</sup>

The precise manner in which the financing of India's sea-based deterrent and its extensive supporting infrastructure will be split up between the Indian Navy and external government allocations remains, however, somewhat nebulous.

It is also unclear whether India's projected flotilla of SSNs will be tasked with SSBN protection, which would prevent it from fulfilling other potential roles, such as forward-deployed sea denial.<sup>29</sup> According to Ravi Ganesh, a retired vice admiral who commanded India's first Charlie-class SSN and led India's ATV program from 2000 to 2004,

the SSNs' primary role will continue to be forward-deployed sea denial and surveillance missions. Carrier defense is possible, although that requires a level of sophistication in sonar and underwater communication technology that we are currently very far from. I do not visualize SSNs being deployed for defense of SSBNs. There are problems of mutual interference and we are unlikely to be able to devote assets to such a restricted role.<sup>30</sup>

Nevertheless, as time goes by and India's SSBN fleet gradually grows in size and importance, a debate will no doubt unfold within the Indian Navy as to how many resources and platforms should be devoted to its protection. Difficult decisions will need to be made, particularly if India's underwater environment becomes more contested. Ensuring SSBN defense might bring about

certain operational opportunity costs. Operational safety is also likely to become an increasingly important issue. Concerns have already been raised after a series of tragic accidents hobbled India's conventional submarine fleet last year, and a hatch on the future INS *Aridhaman* blew off during hydropressure testing, killing an engineer.<sup>31</sup> Following such a string of unfortunate mishaps, the

Indian Ministry of Defense finally cleared a long-standing request from the Indian Navy to procure two deep submergence rescue vehicles.<sup>32</sup> In short, while the launch of India's first indigenous SSBN is, without doubt, a great achievement, it only constitutes the first step in what promises to be a long and onerous process.

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## Current Limitations to Deterrent Patrols

Another lingering question is when the submarines will truly be able to embark on deterrent patrols. The INS *Arihant* had first been described as a “technology demonstrator” rather than a combat vessel.<sup>33</sup> In 2010, however, high-ranking naval officials appeared to indicate that the INS *Arihant* would eventually be deployed on deterrent patrols.<sup>34</sup>

As of early 2015, the *Arihant* has commenced sea trials before its expected commissioning in the same year, and it is slated to be fitted with up to twelve Sagarika K-15 SLBMs. The Sagarika, however, reportedly only has a range of 750 to 800 kilometers (about 466 to 497 miles), which many Indian commentators have described as grossly inadequate.<sup>35</sup> Indeed, with such a short strike radius, the *Arihant* could not effectively target Lahore or Islamabad, let alone China’s strategic centers (see figure 1).<sup>36</sup>

FIGURE 1

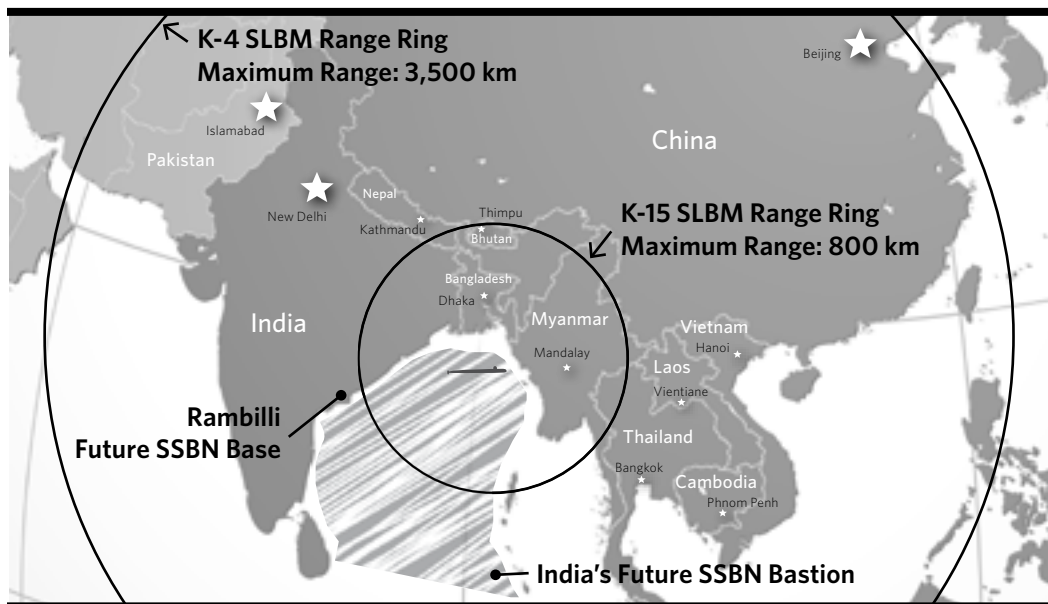


If the Indian Navy wished to enact credible deterrence vis-à-vis China, its SSBNs would need to be forward-deployed in congested Northeast Asian waters. While transiting through shallow and heavily trafficked waterways such as the Malacca Strait, they would be vulnerable to detection and interdiction. Within the closed maritime spaces abutting China’s shores, the submarines could fall prey to the People’s Liberation Army Navy’s strategic ASW efforts. Moreover, the sheer distance involved in such journeys would pose some severe logistical challenges. The *Arihant*’s 83-megawatt pressurized water reactor is reportedly based on first- or second-generation Soviet-era technology and has a short

refueling cycle. These technical limitations will inevitably reduce the length and frequency of the *Arihant's* deterrent patrols.<sup>37</sup> Due to all of these factors, it appears unlikely that the *Arihant* will be sent on deterrent patrols until it, or one of its successors, is fitted with longer-range SLBMs.

India's Defense Research & Development Organization (DRDO) is currently working on two longer-range SLBMs: the 3,500-kilometer-range K-4 (about 2,174 miles), which recently underwent a successful test launch from a submerged pontoon off the coast of Visakhapatnam, and the 5,000-kilometer-range K-5 (approximately 3,106 miles), which appears to still be in the design phase.<sup>38</sup> According to a number of publicly available reports, the *Arihant* is fitted with four universal tube launchers that can each carry either three K-15 missiles or one K-4 missile. Doubts have been raised, however, about the compatibility of the K-4's height with the SSBN's 10.4-meter-diameter hull.<sup>39</sup> If the length of the K-4 cannot be reduced to under 10 meters, the *Arihant* may need to be retrofitted with a hydrodynamic outer envelopment, or bump. Even if engineers from the Defense Research & Development Organization succeed somehow in squeezing the K-4 aboard the *Arihant*, the missile's range remains suboptimal, as it would require the submarine to operate on the northeastern fringes of the Bay of Bengal, skirting Burmese and Bangladeshi littoral waters, in order to target China's major political and economic hubs (see figure 2).<sup>40</sup> The K-5, with a 5,000-kilometer range that would enable Indian SSBNs to target Beijing from India's eastern seaboard, is projected to be at least 12 meters in length, thus most likely ruling out its deployment aboard the *Arihant*.

FIGURE 2



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**In order to enjoy an effective sea-based deterrent vis-à-vis China, New Delhi will need to develop larger SSBNs, with greater missile carriage capacity and more powerful nuclear reactors.**

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In short, in order to enjoy an effective sea-based deterrent vis-à-vis China, New Delhi will need to develop larger SSBNs, with greater missile carriage capacity and more powerful nuclear reactors. Whereas the *Arihant*'s two successors will reportedly share its infelicitous specifications, the fourth planned submarine in the series—the S-5—

will be larger and more advanced.<sup>41</sup> It may take at least a decade, however, for the S-5 to be completed.<sup>42</sup>

### Supporting Infrastructure

Meanwhile, the Indian Navy announced in 2014 that it was planning to construct a major deepwater base in Rambilli on the Bay of Bengal, 50 kilometers (about 31 miles) southwest of Visakhapatnam. Because of its deep water and closer proximity to China, the bay is considered a better staging point for India's nascent undersea deterrent than the shallow, congested waters of the Arabian Sea. Nuclear submarines are typically most vulnerable during ingress and egress activities, and the depth of the water surrounding Rambilli will allow India's SSBNs to slip in and out without being detected by aircraft or satellites.<sup>43</sup> The new facility, codenamed Project Varsha, will reportedly house India's proposed fleet of five to six SSBNs, along with its first indigenously built aircraft carrier, the INS *Vikrant*. The project represents a massive undertaking and will only be completed, at the very earliest, in 2022.<sup>44</sup>

Maintaining the ability to communicate with deep-cruising nuclear submarines constitutes one of the most challenging prerequisites for effective CASD. When SSBNs are on deterrent patrol, they must avoid rising too close to the surface for fear of detection. Instead, communications must be sent via very low frequency (VLF) or extremely low frequency (ELF) messages. VLF can penetrate ocean waters up to about 20 meters, whereas ELF can reach far greater depths, but at a lower data rate—which means that the messages take significantly longer to transmit. Typically, SSBNs are instructed via ELF to rise to VLF depth in order to receive longer messages.

Until 2014, India only possessed one VLF station, INS Kattabomman, which was commissioned in 1990 at South Vijayanarayanam in Tamil Nadu State.<sup>45</sup> In 2010, the Indian Navy authorized the construction of two new transmitter towers at INS Kattabomman, which has significantly improved the facility's data transmission speed.<sup>46</sup> More recently,

India built its first ELF station, which appears to be located on the same site.<sup>47</sup> India's Eastern Naval Command has also reportedly acquired 2,900 acres of land in the state of Telangana for another transmission center, although at this stage it remains unclear whether the planned facility will be for ELF or VLF communications.<sup>48</sup>

In the event of conflict, however, these large and highly visible targets would be acutely vulnerable to air and missile strikes. In order to strengthen the security of their subsurface communications, most nuclear powers during the Cold War began to deploy long-trailing ELF and VLF antennas aboard aircraft.<sup>49</sup> In the United States' case, this airborne system of survivable communication links was designated by the acronym TACAMO (for Take Charge and Move Out).

If India aims to knit together a resilient, multilayered strategic communications network, it may need to funnel additional investments into a squadron of TACAMO-style aircraft. Indeed, according to Arun Prakash,

the modification of a multi-engined aircraft, with a trailing-wire VLF-ELF antenna, is entirely feasible and will probably be adopted for C2 [command and control] once SSBNs commence deterrent patrols.<sup>50</sup>

## The Surface-Based Component

A somewhat puzzling development lies in India's decision to conduct a series of test firings, starting in 2000, of Dhanush-class short-range ballistic missiles (SRBMs) from offshore patrol vessels. The Dhanush has a reported range of 350 kilometers (about 217 miles).<sup>51</sup> As of early 2015, it remains unclear whether the tests were intended to display a formal recognition of India's willingness to station nuclear-tipped ballistic missiles aboard conventional vessels or whether the Dhanush program has served primarily as a technology demonstrator.<sup>52</sup>

For the Indian Navy, the program appears to be merely a temporary substitute for the SSBN fleet. However, it may take India at least another decade before it can credibly claim to have attained CASD. Uncertainties abound as to what role the Dhanush program will play during this potentially protracted interim period.

## The Command and Control Challenge

Last but not least, the submarine-based leg of the triad will have a major impact on India's nuclear command-and-control arrangements.<sup>53</sup> As Vipin Narang, a professor at the Massachusetts Institute of Technology, notes:



Although India's force disposition and stewardship procedures have evolved over the decades, the key permanent feature of India's assured retaliation posture is that civilians not only maintain control over India's nuclear forces, but they maintain custody of it. . . . Thus, in peacetime and even in relatively intense crises, India's nuclear arsenal is kept under firm civilian control, which minimizes the risk of unintentional use.<sup>54</sup>

With the advent of canisterized nuclear missiles aboard SSBNs, the issue of warhead mating, which involves Defense Research & Development Organization and Department of Atomic Energy personnel, will "no longer be germane," according to Arun Prakash. Civilian decisionmakers will be compelled to replace institutional or negative controls with procedural or positive controls.<sup>55</sup> In discussions with this author, Indian naval officers frequently reiterated that civilians would not be permitted on an SSBN during deterrent patrols, and that as a result, negative controls would need to be replaced by fail-safe electronic permissive action links.

For the surface-based component of the naval deterrent, the issue is less pressing, as institutional separation and control could be maintained through the presence of civilian representatives on board.

## **PAKISTAN'S NAVAL NUCLEAR "FORCE IN BEING"**

### **An Adjustable Nuclear Posture**

Pakistan's nuclear posture over the years has been both catalytic and asymmetric.<sup>56</sup> It has performed a catalytic diplomatic function by providing a medium of external signaling, which can be used to draw external powers into Indo-Pakistani disputes, most notably over the contested territory of Kashmir, and it has served an asymmetric military purpose by offsetting the growing conventional superiority of its overbearing neighbor.

Refusing to adhere to a no-first-use policy, Islamabad views its nuclear posture and arsenal as variables that can be adjusted in order to blunt India's conventional military advantage, which, notes retired Pakistani Commander Muhammad Azam Khan, is "most pronounced in the maritime field."<sup>57</sup> In 2002, Lieutenant General Khalid Kidwai, then director of Pakistan's Strategic Plans Division, the entity responsible for safeguarding Pakistan's nuclear arsenal, laid out the conditions under which Pakistan would envisage nuclear use:

Nuclear weapons are aimed solely at India. In case that deterrence fails, they will be used if a) India attacks Pakistan and conquers a large part of its territory, b) India destroys a large part of either its land or air

forces, c) India proceeds to the economic strangling of Pakistan, or d) India pushes Pakistan into political destabilization or creates a large-scale internal subversion in Pakistan.<sup>58</sup>

The fact that economic strangulation was mentioned only three years after the Kargil War between India and Pakistan, during which the Indian Navy threatened a blockade by establishing a cordon sanitaire around the port of Karachi, is no coincidence. Clearly Islamabad is in the habit of adding a measure of elasticity to its redlines, depending on changes in strategic circumstances.<sup>59</sup>

## Developing a Sea-Based Deterrent

Some Pakistani officials and commentators have claimed that India's launching of the *Arihant* was the event that prompted Islamabad's development of a sea-based nuclear capability. Abdul Basit, then foreign office spokesman, described the "induction of new lethal weapon systems as detrimental to regional peace and stability," and journalists lamented the fact that India had behaved irresponsibly by choosing to take the Indo-Pakistani nuclear race to sea.<sup>60</sup> Khan observed that it constituted the first step in "the military nuclearization of the Indian Ocean," adding that it "noticeably dents the strategic balance; it has the potential to trigger a nuclear arms race."<sup>61</sup>

In reality, however, Pakistan had begun seriously considering the acquisition of a sea-based deterrent long before the *Arihant* was launched. Eight years earlier, in February 2001, the Pakistan Navy publicly acknowledged that it was considering deploying nuclear weapons aboard its conventional submarines. This was reiterated in 2003 by Admiral Shahid Karimullah, then chief of naval staff, who announced that while no such immediate plans existed, Pakistan would not hesitate to take such steps if it felt so compelled.<sup>62</sup>

In May 2012, Pakistan formally inaugurated the headquarters of the Naval Strategic Force Command. A press release from the country's Inter Services Public Relations stated the future naval strategic force "will strengthen Pakistan's policy of Credible Minimum Deterrence and ensure regional stability," and, perhaps most intriguingly, called it the "custodian of the nation's 2nd strike capability."<sup>63</sup>

Although there have been some (unsubstantiated) reports of a secret project led by the Pakistan Atomic Energy Commission to design a miniaturized nuclear power plant for a submarine, it seems far more likely that Pakistan will attempt to mate nuclear-tipped cruise missiles with conventional diesel-electric submarines.<sup>64</sup> When interviewed, Pakistani commanders mentioned the precedent set by Israel's alleged decision to place nuclear-tipped cruise missiles aboard conventional submarines and suggested that their country should follow suit.<sup>65</sup>

In recent years, Pakistan has shifted from an earlier generation of enriched uranium nuclear weapons to a newer generation of plutonium weapons. This has allowed it to both significantly expand its nuclear arsenal and to make progress in the miniaturization of its nuclear warheads for cruise missiles and battlefield use.<sup>66</sup> Mansoor Ahmed, a lecturer at Pakistan's Quaid-i-Azam University, has thus averred that

in Pakistan's case, availability of plutonium and possibly tritium from the Khushab Nuclear Complex in the last fourteen years and the expansion in the production capacity at this site will allow Pakistan to develop boosted-fission warheads for its SLCMs [submarine-launched cruise missiles], such as the naval version of Babar [Babur]. Such warheads can also be deployed on conventional attack submarines (SSKs) such as the Pakistani Air Independent Propulsion (AIP) equipped Agosta 90-Bs in the future.<sup>67</sup>

Other Pakistani commentators have ventured that the Pakistan Navy may attempt to station tactical nuclear weapons aboard surface ships, or they have suggested that the service's P-3C Orion maritime patrol craft be given a tactical nuclear role.<sup>68</sup>

Islamabad is currently developing a sea-based variant of its nuclear-capable, indigenously produced Babur missile, a subsonic, low-level, terrain-mapping land attack cruise missile with a reported range of 700 kilometers (about 435 miles).<sup>69</sup> According to Feroz Khan, a former Pakistan Army brigadier, the project has been placed under the tutelage of Pakistan's Maritime Technologies Complex and is nearing completion.<sup>70</sup> In December 2012, the Pakistan Navy conducted a series of cruise missile tests from naval platforms in the Arabian Sea. The official statement did not give the precise specifications of the missile in question, simply declaring that the test included "firings of a variety of modern missiles" and that it reaffirmed "credibility of deterrence at sea."<sup>71</sup>

## The Logic Behind Naval Nuclear Coercion

Pakistan's naval nuclear ambitions are fueled primarily by the sense of a growing conventional rather than strategic imbalance. Through the nuclearization of its own fleet,

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Islamabad hopes to prevent the Indian Navy from translating its conventional superiority into effective coercive power. Since the Indo-Pakistani war of 1971, when India's Osa-class missile boats conducted a daring nighttime raid against Karachi, Pakistani naval

planners have sought, first and foremost, to prevent the Indian Navy from acquiring the ability to put debilitating pressure on Pakistan's maritime flank. The Pakistan Navy's concerns were compounded by their Indian counterpart's actions during Operation Talwar, in the midst of the 1999 Kargil War, and during Operation Parakram in 2001–2002. In both cases, the Indian Navy surged elements from its Eastern and Western Fleets in order to engage in coercive maneuvering in the North Arabian Sea.

India's maritime strategy includes the following assessment of the 1999 deployment:

The Indian Navy short-listed three goals, namely to ensure safety and security of our maritime interests against a surprise attack, to deter Pakistan from escalating the conflict into a full-scale war and to win the war convincingly at sea. The lesson that emerges for the Indian Navy is on two counts. Firstly, there will be space and scope to conduct conventional maritime operations below the nuclear threshold. Secondly, a window of opportunity would exist to influence the land battle.<sup>72</sup>

From the Indian Navy's point of view, such actions provided a means of projecting what some scholars have referred to as triadic deterrence—that is, using “threats and/or punishments against another state to coerce it to prevent non-state actors from conducting attacks from its territory”—all while maintaining the conflict below the nuclear threshold.<sup>73</sup>

For Pakistani naval planners, however, both incidents were sobering reminders of their coastal nation's glaring vulnerability to blockade and strategies of commodity denial.<sup>74</sup> Moeed Yusuf provides the following summary of how India's naval actions were perceived in Pakistan:

It would seem that the Kargil episode would have signaled to the Pakistani armed forces, army included, that if the advent of nuclear weapons had made the prospects of limited war more likely by allowing Pakistan to use the space below India's nuclear threshold with impunity, it also meant that India would counter Pakistan's advantage at the lowest rung of the escalation ladder by exploiting its naval superiority early on in the crisis. In essence, India was using the sea to neutralize Pakistan's low-end strategic space under the nuclear umbrella.<sup>75</sup>

Islamabad appears particularly concerned over New Delhi's ability to interfere with its crude oil imports, which accounted for 31 percent of Pakistan's total energy supply in 2012.<sup>76</sup> Energy shortages have frequently led to riots in Pakistan's major cities, and for many Pakistani security managers, any protracted disruption of sea-borne energy would automatically result in dangerous levels of unrest.

Unable to sustain any remotely symmetrical form of naval competition, the Pakistan Navy sees nuclearization as the most effective means of countering Indian maritime power projection. Writing in 2004, five years before India unveiled the *Arihant*, Pakistani Lieutenant Commander Raja Rab Nawaz posited that

limited conventional war at sea between India and Pakistan is more[,] not less likely in a future conflict. Overwhelming conventional superiority of the Indian Navy poses serious challenges in case of such an eventuality. . . . Pakistan must acquire a sea-based second-strike capability to maintain strategic balance in the region.<sup>77</sup>

Security managers in New Delhi are probably unaware of the extent to which their nation's growing maritime strength is perceived as a threat in Pakistan. An illustration of this perceptual mismatch was provided in the course of a crisis simulation exercise organized by the U.S. Naval Postgraduate School in 2013. Held in Sri Lanka, the exercise included both Indian and Pakistani participants, ranging from retired military officials to civilian academics. The simulation began with a mass terrorist attack in an Indian cricket stadium, which appeared to have originated in Pakistan. The Indian team immediately responded by initiating a number of moves that they considered "limited" and "punitive" in nature, including the implementation of a maritime exclusion zone (MEZ) along Pakistan's Makran coast. Whereas the Indian participants deemed this action "restrained, justified, and short of war," the "enforcement of the MEZ off the Makran coast were deemed by the Pakistan team as acts of war."<sup>78</sup> As the exercise continued to unfold, Pakistan began to heighten its nuclear readiness level and threatened first use.

This form of coercive nuclear signaling is entirely in line with weaker states' thinking with regard to the strategic utility of nuclear weapons.<sup>79</sup> By threatening either directly or indirectly to employ low-yield nuclear weapons at sea or against an advancing Indian aircraft carrier strike force, Islamabad can hope to acquire escalation dominance and considerably dilute its larger neighbor's coercive naval power.<sup>80</sup>

## Pakistan's Fear of a Preemptive Seizure or Strike on Its Land-Based Nuclear Assets

Stationing a portion of the nation's nuclear arsenal on or under the sea also guarantees an extra measure of reassurance for jittery officers in Pakistan's Strategic Plans Division.

The Pakistani military has long fretted over the possibility of foreign seizure or preemptive destruction of its land-based nuclear assets.<sup>81</sup> The progressive fraying of Islamabad's ties with Washington and the way a U.S. Navy SEAL team was able to penetrate deep inside Pakistani territory and assassinate Osama bin Laden have only reinforced

Pakistan's fears over the security of its nuclear arsenal.<sup>82</sup> Meanwhile, as Washington and New Delhi's relations have continued on their upward trajectory, Pakistan has grown increasingly concerned that both democracies might share intelligence regarding the location of its nuclear stockpiles.

## A Response to Cold Start

Frustrated by its inability to both deter and rapidly respond to violent acts of terrorism originating from Pakistan, the Indian military has been working to devise operational concepts that would enable it to safely wage a limited conventional war under a nuclear overhang. One such concept formulated by the army, termed Cold Start, envisions a type of blitzkrieg warfare, relying on fast integrated battle groups and closely synchronized army and air force operations in order to conduct lightning retaliatory strikes and potentially gain temporary control of shallow tracts of Pakistani territory.<sup>83</sup> Cold Start has never been formally validated by India's official leadership, let alone the other services, and it is still very much viewed as something of a strategic hypothesis.<sup>84</sup>

Unfortunately, however, the idea has gained traction in Pakistan, where commentators frequently depict it as proof of India's belligerence and alleged desire to further dismember its smaller neighbor.

Pakistan's doctrinal response has been to reemphasize its readiness to use nuclear weapons to destroy Indian mechanized forces, arguing that "the wider the conventional asymmetry, the lower the nuclear threshold."<sup>85</sup> Equipping a submarine or surface vessel with nuclear-tipped cruise missiles would enable the Pakistan Navy to engage in intra-war coercion through the threat of horizontal escalation, thus potentially compelling Indian ground forces to withdraw. Indeed, some analysts have suggested that Pakistani security managers might be considering a mix of different potential targets in the event of nuclear use, separated into low-, medium-, and high-end options. The low end might involve demonstration nuclear strikes against Indian conventional assets—primarily as a means of demonstrating Islamabad's willingness to escalate even further.<sup>86</sup> This would bear certain similarities to Russia's thinking with regard to the use of tactical nuclear weapons as a means of brutally "de-escalating" (in Russian parlance) high-end conventional conflict.<sup>87</sup>

If such a decision were to be made, a demonstration nuclear strike at sea would no doubt be considered a much more attractive—and potentially less escalatory—option than an attack on land.

## Strategic Depth

The quest for strategic depth has long constituted one of the core components of the Pakistani military's geopolitical mind-set.

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Strategic depth would allow Pakistan to more effectively respond to a putative Indian incursion by focusing the entirety of its forces on the Indo-Pakistani front. This would enable it to achieve greater parity with an Indian military that is obliged to

deploy a substantial portion of its forces along the Sino-Indian border. In order to achieve strategic depth, Islamabad needs to make sure that it does not face a threat on both of its frontiers, and therefore it must rely on a friendly or compliant regime in Afghanistan.

The notion of strategic depth became particularly popular at the end of the 1980s, when both India and Pakistan were covertly developing nuclear weapons programs. General Mirza Aslam Beg, Pakistan Army chief of staff from 1988 to 1991, advocated the scattering of nuclear assets and air force bases across Afghan territory, from where Pakistan could continue to launch strikes against India in the event that its territory was overrun or destroyed.<sup>88</sup>

Pakistan has thus consistently viewed Afghanistan both as its strategic backyard and as a launchpad for its war of a thousand cuts against India in Kashmir, whether by actively supporting the Taliban during the long period of factional struggle that followed the Soviet Union's departure from Afghanistan or by continuing, more recently, to aid insurgent groups such as the Haqqani network based in North Waziristan.<sup>89</sup>

Pursuing a sea-based nuclear strike capability allows Pakistan to acquire the strategic depth that it has traditionally sought to acquire across the Hindu Kush. For even though, at the time of writing, Western nations are projected to have withdrawn the vast majority of their troops from Afghanistan within a year, Pakistan's hopes of transforming the country into its Central Asian proxy are likely to remain unfulfilled. The prospect of pursuing a sustained rearguard action or placing hidden second-strike assets deep in Afghan's interior appears particularly untenable. Shifting part of its nuclear arsenal to sea thus allows Pakistan to acquire the greater degree of survivability it was hoping to one day achieve through dispersion in a subservient Afghanistan.

## Countering Indian Plans for Ballistic Missile Defense

Since approximately the mid-2000s, India has expressed an interest in developing a ballistic missile defense system to help protect its major cities and infrastructure. While precise information on the progress of India's ballistic missile defense is hard to come by, it would appear that New Delhi has been working toward both an indigenous system and dual ventures incorporating Russian, Israeli, or French technology.<sup>90</sup> Scholars of nuclear issues in South Asia have long warned of the potentially destabilizing effects of introducing missile defense to the subcontinent, equating the danger with that injected by the introduction of counterforce nuclear capabilities during the Cold War.<sup>91</sup>

Pakistan's reactions to India's projected antiballistic missile defenses largely reflect these concerns. One method Islamabad may use to circumvent an operational Indian system, proposed by both Mansoor Ahmed, a strategic studies professor, and Usman Shabbir of the Pakistan Military Consortium think tank, would be to employ submarine-launched, nuclear-tipped cruise missiles.<sup>92</sup>





# INSIGHTS FROM THE COLD WAR

**CONTEMPORARY SOUTH ASIAN** nuclear dynamics may be unique in their specificity, yet many interesting, and potentially instructive, parallels—as well as certain revealing differences—can still be gleaned from the past.

At the dawn of the atomic age, Soviet and Western naval strategists found themselves grappling with a set of daunting and unprecedented challenges. Accustomed to the laws of conventional naval warfare, fleet commanders were suddenly compelled to operate under a nuclear shadow. As a result, many of their core assumptions concerning the conduct of naval operations, whether in times of peace or of war, underwent a fundamental revision. Looming in the backdrop of every naval deployment was the possibility, however remote, of tensions escalating into conflict and of conventional maritime combat spiraling into a potentially catastrophic naval nuclear exchange. As Paul Nitze observed in a seminal article in 1956, the situation confronting the two superpowers had become analogous to a hair-raising game of chess, whereby

the atomic queens may never be brought into play; they may never actually take one of the opponent's pieces. But the position of the atomic queens may still have a decisive bearing on which side can safely advance a limited-war bishop or even a cold-war pawn. The advance of a cold-war pawn may even disclose a check of the opponent's king by a well-positioned atomic queen.<sup>93</sup>

Using a different metaphor but describing essentially the same phenomenon, French strategists, such as Andre Beaufre, wrote that “the nuclear force may be unseen, but it is always there, and it is this which sets the boundaries of the battlefield.”<sup>94</sup>

The problem with the maritime domain, however, was its very lack of boundaries. In contrast to the clear terrestrial delineations among North Atlantic Treaty Organization (NATO) and Warsaw Pact forces in Eastern and Central Europe, the world’s oceans provided a vast arena where both superpowers’ navies were in almost incessant interaction. The frequency of these contacts inevitably led to moments of friction and occasionally to incidents that severely imperiled strategic stability. As both superpowers aggrandized and diversified their nuclear arsenals, they devoted a great deal of attention to the maritime domain—not only in terms of SSBN operations and CASD—but also as a theater of operations potentially more susceptible to the conduct of tactical nuclear warfare.

As academics such as Francis Gavin have aptly noted, the study of history can prove most useful when it is conducted “horizontally,” exposing connections over time and space.<sup>95</sup> Many of the challenges Indian and Pakistani security managers will inevitably come to face in the not-too-distant future were, in fact, discussed at length during the Cold War’s multidecadal naval nuclear competition.

## CONVENTIONAL NAVAL OPERATIONS UNDER A NUCLEAR SHADOW

For much of the Cold War, the balance of conventional military power on the Eurasian continent was in the Soviet Union’s favor. As a result, NATO planners relied heavily on the threat of nuclear use as a means of projecting deterrence.

In the naval domain, the situation was reversed, with Western navies enjoying a distinct superiority—both technological and numerical—over their Soviet rival. From the very beginning of the Cold War, Western planners fretted over the possibility that the Soviets might attempt to offset their conventional naval inferiority by threatening to employ nuclear weapons at sea.

The vulnerability of large surface ships to nuclear attack, in particular, became a source of much concern to nuclear strategists. For instance, Edward Teller, the father of the hydrogen bomb, advised against the deployment of aircraft carriers, writing that in his mind, an aircraft carrier

looked to me like quite a good target. In fact, if I project my mind into a time, when not only we, but also a potential enemy, have plenty of atomic bombs, I would not put so many dollars and so many people

into so good a target. Come to think of it, I would not put anything on the surface of the ocean—it's too good a target.<sup>96</sup>

U.S. naval commanders warned that, in the event of conflict, the Soviet Union's Strategic Missile Forces might seek to supplement the actions of a conventionally outmatched Soviet Navy by targeting Western naval task forces or convoys. Writing in the *Naval War College Review* in the late 1960s, one U.S. lieutenant commander made a dire observation:

If one side presented the preponderance of targets the use of nuclear forces could be advantageous to the other side. The preponderance of surface forces in the West makes it extremely strong in a conventional war. However, as soon as the [Soviet] Bloc use of nuclear weapons is conceded, the loss of many of these vessels can be expected with a relatively small amount of effort on the part of the Bloc Forces.<sup>97</sup>

Strategists such as Desmond Ball also noted that

the destruction of large naval assets would disproportionately disadvantage the United States, both because of the enormous U.S. investment in its carrier forces, and because of the greater U.S. dependence on sea lines of communication.<sup>98</sup>

This vulnerability of large, densely concentrated naval formations to nuclear weapons led to something of a conundrum. The natural response to such a threat, argued both Soviet and Western strategists, was to engage in fleet or battle group spacing to reduce the likelihood of multiple kills resulting from a single nuclear blast.<sup>99</sup> The need for dispersal, however, flew in the face of centuries of naval practice. Preeminent Soviet military theorists began to question the very relevance of naval strategy, commenting that in the nuclear missile era, the most deeply ingrained principles of Soviet naval tactics, such as “massed action” (*massirovanie*) and “combined action” (*vzaimodeystvie raznorodnykh sil*), could no longer be considered valid.<sup>100</sup> This presented military planners with a fundamental dilemma, as, notes one former U.S. Army attaché to Pakistan, “Survival in a nuclear environment required dispersal, while success in a conventional fight required mass and concentration.”<sup>101</sup>

Within such a heavily nuclearized environment, the prospective operational benefits to be derived from launching a first salvo became even more apparent.<sup>102</sup> Additionally, the escalation dynamics of warfare in the maritime theater appeared, in the eyes of many naval analysts, to be considerably less constrained than those attending military operations on land. In the late 1950s and early 1960s, figures such as Henry Kissinger noted that limited nuclear war between Soviet and Western forces was far more likely to flare up in secondary or peripheral theaters than along the heavily militarized Central European front.<sup>103</sup>

To some theorists, the likelihood of one side initiating limited nuclear war hinged upon two main factors: whether the use of nuclear weapons could be confined to a specific geographical area, and whether they could be used “surgically,” without incurring mass civilian casualties or the destruction of strategic centers.<sup>104</sup> Out on the wide-open waters, the use of low-yield nuclear weapons against enemy vessels would result in little to no collateral civilian casualties. As one U.S. naval officer wrote in 1967, “What targets of a tactical or strategic nature can be attacked and destroyed with less direct involvement of civilian populations than naval forces at sea?”<sup>105</sup>

How then, wondered Western nuclear strategists, could the Soviets be deterred from employing—or from threatening to employ—nuclear weapons against NATO’s naval forces? Some posited that there was scant likelihood that the Soviet Navy would seek to erode firebreaks between conventional and nuclear forces by genuinely subscribing to a nuclear warfighting strategy.<sup>106</sup> The use of even a few tactical nuclear weapons—however isolated the maritime theater in question—ran the risk of escalating to strategic exchange through the phenomenon of linkage. There was little reason, therefore, for the United States and its allies to emphasize naval nuclear warfare.<sup>107</sup>

Others argued that the only true way to prevent the Soviets from engaging in coercive nuclear escalation at sea was to nuclearize close to the entirety of the combat fleet architecture. The U.S. Navy agreed and adopted a strategy of escalation dominance by engaging in the wholesale nuclearization of its combat fleet while striving to disabuse the Soviet leadership of any notion that a nuclear war at sea could be limited.

This evolution in naval nuclear force posture was greatly facilitated by the wider doctrinal shift, in the mid-1950s and onward, from a deterrent policy predicated on massive retaliation toward one of a more graduated or flexible response.<sup>108</sup> In 1982, Richard Perle, then assistant secretary of defense for international security policy, declared that official U.S. policy was to “discourage the Soviets from believing that they could limit a nuclear war to forces at sea.” He also stressed that

the Soviets retain a significant capability to attack ships at sea, and they may, as a consequence, be misled into believing that so long as civilian casualties are not involved in such attacks, as they presumably would not be, they could in fact limit a war to attacks on forces at sea. . . . The desire on our part is not to permit the Soviets to determine the scope of the battle to give whatever advantages would be inherent in their having the freedom to choose where the battle would be fought.<sup>109</sup>

By the 1980s, however, conventional and nuclear weapons were commingled on U.S. surface and subsurface vessels. The fleet was equipped with a large and impressively broad inventory of tactical nuclear weapons, ranging from nuclear anti-submarine rockets to nuclear-tipped cruise missiles and surface-to-air missiles.<sup>110</sup> For proponents of a strategy

of flexible response, such a shift made eminent sense. Supporters argued that this wide dispersal of nuclear assets across the fleet had vastly augmented the allied nuclear reserve, thus effectively dampening any lingering Soviet temptation to conduct a “coordinated, preemptive strike at sea.”<sup>111</sup> Moreover, the ubiquitous presence of theater nuclear weapons aboard U.S. vessels served a vital signaling function. It was both a means of communicating resolve, thus dissuading the Soviets from engaging in escalatory naval actions, and a way of demonstrating the strength of U.S. commitment to certain fretful, and geographically distant, allies. The deployment of naval platforms with nuclear-delivery capability, wrote military analyst Richard Fieldhouse, could “critically affect the dynamics of the crisis situation in a number of ways.” For example,

perceptions of the stakes involved could be raised by the presence of U.S. tactical nuclear forces; and these forces could significantly alter the actual military capabilities of the forces involved, thus improving escalation control by complicating the adversaries’ calculations of success and failure.<sup>112</sup>

## **NAVAL FRICTION AND THE RISK OF INADVERTENT ESCALATION**

For many analysts, the generalized commingling of conventional and nuclear assets at sea was dangerously escalatory. In times of conflict, Soviet and Western naval commanders would have no way of determining whether enemy vessels were armed with nuclear weapons or not, and a radioactive fog of war would float over combat operations.

The most controversial dual-capable system was the sea-launched variant of the Tomahawk cruise missile. Fitted aboard both surface and subsurface vessels, the Tomahawk’s long range (approximately 2,500 kilometers, or about 1,550 miles) and precision made it an ideal candidate for counterforce missions.<sup>113</sup> This meant, noted one observer, that

with respect to the conventional/nuclear firebreak, the Soviet Union must consider any vessel equipped with Tomahawks to be a nuclear threat even if in fact these missiles are only carrying conventional payloads. The obfuscation of these distinctions is likely to increase Soviet paranoia about U.S. naval deployments in the vicinity of the Soviet homeland; it inevitably reduces the degree of certainty with which Soviet responses can be predicted; it increases the likelihood of escalation from actions that the U.S. might regard as tactical; and it increases the chances of miscalculation and misperception and hence of inadvertent escalation.<sup>114</sup>

The dangers of sudden escalation arising from ill-perceived signaling or deployments were heightened in the maritime domain, where naval interactions frequently led to friction and where conflicts at times continued even after crises had abated on land.<sup>115</sup> A classic example is the tense situation that unfolded underwater during the Cuban Missile Crisis, which almost led to disaster. Historians now know that each of the Soviet submarines deployed off Cuba was armed with nuclear-tipped torpedoes, a fact that was not known by the U.S. Navy at the time. In an attempt to force the Soviet submarines to surface, the U.S. fleet dropped practice depth charges. They were not intended to hit the submarines, but rather to coerce them into revealing themselves. The Soviet submarine officers, however, viewed these actions in a different light, and one harried commander ordered his men to assemble the nuclear torpedo to battle-readiness.<sup>116</sup>

Even after both superpowers signed the 1972 Incidents at Sea Agreement, their naval interactions remained prone to sporadic bursts of tension, such as during the 1973 Arab-Israeli conflict.<sup>117</sup> Episodes of brinkmanship involving games of chicken, aggressive forward intelligence gathering, and accidental collisions were particularly prevalent in the subsurface domain, which had been deliberately excluded from the agreement.<sup>118</sup>

The risks of inadvertent escalation were exacerbated, argued Professor Barry Posen, when conventional naval operations produced “patterns of damage or threat” to structural components of a nation’s nuclear reserves, such as its SSBNs.<sup>119</sup> During the administration of U.S. President Ronald Reagan, the U.S. Navy’s maritime strategy explicitly called for an aggressive ASW campaign by U.S. and allied naval forces against the entirety of the Soviet submarine fleet, SSBNs included.<sup>120</sup> Conventional attrition of a substantial portion of the Soviet Union’s second-strike capability, argued Posen, could be viewed by Moscow as a precursor to a nuclear attack, and this, in turn, might heighten Soviet temptations to engage in a preemptive nuclear strike against NATO forces. John Mearsheimer, a political science professor, also perceived anti-SSBN operations as highly destabilizing, noting that

some strategies also can cause forces to intermingle in a crisis in a manner that produces a tactical or strategic first strike advantage. . . . Some strategies can raise the risk that forces will collide with one another in a manner that activates one side’s rules of engagement, leading it to commence firing. In each instance crisis stability is undermined, and crises are more likely to erupt into war.<sup>121</sup>

Hardline defenders of the 1980s maritime strategy rejected these critiques, and they argued that, to the contrary, threatening Soviet SSBNs provided the allies with significant leverage in times of conflict, which might then be used in favor of war termination.<sup>122</sup> Linton Brooks, who served on the Reagan administration’s National Security Council, agreed with this assessment, noting that the maritime strategy also provided a means of eroding the offensive capability of the Soviet SSN fleet, which would find itself compelled

to focus its energy on protecting SSBNs, rather than on attacking allied sea lines of communication.<sup>123</sup>

For this school of thinkers, the systemization of dual-use platforms at sea did not weaken but buttressed deterrence—precisely due to the fact that it injected a certain degree of ambiguity. Professor Thomas Schelling famously referred to this as the “threat that leaves something to chance.”<sup>124</sup> Thus, for Linton Brooks,

deterrence is enhanced through the deliberate importation of both risk and uncertainty. . . . Sea-based systems, able to attack a wide spectrum of targets from a large number of platforms, over a broad spectrum of attack azimuths, complicate Soviet defense planning immeasurably, thus strengthening deterrence.<sup>125</sup>

Other observers expressed skepticism over the notion that the Soviet Navy might respond to conventional attacks on its SSBNs by employing sea-based tactical nuclear weapons, arguing that Moscow’s political control over nuclear delivery systems was too tight and that the Soviet leadership would never authorize such a response.<sup>126</sup>





# APPLYING COLD WAR LESSONS TO CONTEMPORARY SOUTH ASIA

**WHAT LESSONS CAN** be drawn from the Cold War's wealth of deliberations over issues such as sea-based nuclear weapons, naval nuclear warfare, and escalation control? As New Delhi and Islamabad lay out the rudiments of their respective naval nuclear architectures, they will no doubt find themselves wrestling with a remarkably similar array of operational predicaments and deterrence-related challenges.

Both nations are still in the process of shaping their sea-based nuclear force structures, and naval nuclear interactions are likely to remain somewhat sporadic for the next few years. This constitutes a singularly opportune moment, therefore, for security communities in both capitals to engage in a much more granular analysis of past naval nuclear operations and strategies.

The issue of dual-use platforms, whereby conventional and nuclear assets commingle and overlap, is of particular relevance to contemporary South Asia, as are many of the Cold War era's discussions over the tactical quandaries inherent in naval operations under a nuclear shadow.

South Asia's maritime environment remains, for its part, alarmingly unstructured, and the challenges posed by naval friction and misperception will no doubt loom large in future times of crisis. Perhaps most importantly, Cold War theorists' concerns over the considerable risks linked to the conventional targeting of strategic or nuclear-armed platforms will urgently need to be addressed.

## THE COMMINGLING ISSUE

Both India and Pakistan appear to be opting for naval nuclear force structures that incorporate dual-capable systems. In India's case, this may only be a temporary phenomenon. It remains unclear whether the Dhanush program is truly envisaged as forming a component of India's nascent sea-based deterrent, or whether the decision to fit surface ships with modified versions of the Prithvi SRBM is simply a stopgap measure while the country's SSBN fleet gradually takes shape.<sup>127</sup> Writing in 2001, a seasoned observer of security developments in South Asia depicted the Dhanush program as the result of mainly bureaucratic calculations, stating that it

is unlikely to result in a sea-based nuclear deterrent—at least on present plans—since it is driven primarily by the Indian Navy's interest in acquiring a land-attack capability vis-à-vis Pakistan in order to assert its own strategic relevance to the larger war-fighting outcomes within the Indian subcontinent.<sup>128</sup>

There are also some practical considerations that would appear to militate against equipping Indian surface vessels with such a system. First of all, the Dhanush is a liquid-fueled SRBM, and it can prove both difficult and hazardous to handle liquid propellants at sea. Moreover, liquid-fueled missiles take longer to launch than their solid-fueled counterparts, which raises questions over the viability of the Dhanush as a robust second-strike system. Finally, in the event of conflict, India's surface ships could prove highly vulnerable to enemy anti-surface-warfare operations.

Unfortunately, due to the Indian political leadership's traditional reticence to discuss details pertaining to the nation's nuclear force structure, public discourse on the Dhanush has been captured by the scientists of India's DRDO. In 2011, officials from this organization were recorded as saying that the successful launches of the Prithvi from land and sea had established that "different forms of [India's] nuclear deterrence are in place" and that the launches allowed India's Strategic Forces Command to launch (nuclear) attacks "both from land and sea."<sup>129</sup> The Defense Research & Development Organization, however, has developed an unfortunate habit of issuing assertive statements that do not necessarily reflect the views of India's political leadership.<sup>130</sup>

Beyond the practical limitations associated with deploying SRBMs from surface vessels, the debate, as it did during the Cold War, appears to revolve around two very different schools of thought. On the one side are those who believe that deterrence can be strengthened through the injection of ambiguity, and on the other are those who argue that the deliberate blurring of conventional and nuclear platforms is far more likely to heighten the risks of vertical escalation.<sup>131</sup>

One school of thinkers argues that opting to conflate conventional and nuclear assets at sea could have serious ramifications in times of crisis. This problem has been singled out by a trio of U.S. Naval War College professors, who have warned that

if one navy stations nuclear weapons aboard conventionally armed warships, its antagonist could end up inadvertently destroying nuclear forces in the process of targeting conventionally armed forces.<sup>132</sup>

Echoing the arguments of Linton Brooks during the Cold War, Ashley Tellis, formerly at the RAND Corporation, has taken a different position, arguing that the very ambiguity of the SRBM's payload could provide India with the opportunity to "secure strategic benefits," adding that

the fact that Islamabad can never be certain as to whether these stand-off capabilities—especially the ship-based ballistic missile systems—are purely conventional or nuclear-armed make such unorthodox deployment postures particularly attractive from a strategic point of view: These sea-based systems serve to levy a potential threat on Pakistan from what is otherwise a non-traditional axis, and, by that very fact, compel Islamabad to allocate military resources to sanitize them even though the strike systems in question may finally turn out to be no more than conventionally armed vehicles of little strategic significance.<sup>133</sup>

Whereas it remains unclear whether India has expressly chosen a path that emphasizes commingling, Pakistan's security managers fall squarely into the "blurring is best" school. As discussed in the first section of this report, Pakistan's naval officers and strategists openly advocate nuclearizing a large portion of the Pakistani fleet architecture—not only submarines, but also surface vessels and maritime patrol aircraft.

By wantonly engaging in a horizontal dispersal of its nuclear assets at sea, Islamabad runs the risk of adding a considerable amount of instability to its naval interactions with its larger South Asian neighbor. Pakistan's calculation may be that such a move would effectively neuter the Indian Navy by preventing it from prosecuting Pakistani vessels in the event of hostilities. This assumption, however, may be deeply flawed.

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## CONVENTIONAL OPERATIONS AND STRATEGIC INSTABILITY

Several observers have noted that Indian military personnel have openly alluded to the fact that Pakistan's nuclear assets would be targeted by Indian conventional forces in the event of war.<sup>134</sup>

Although India's nuclear doctrine may revolve around countervalue targeting, its conventional operational constructs appear to incorporate some potentially destabilizing counterforce elements. In many ways, this is reminiscent of Barry Posen's discussion of the risks posed by conventional operations that cause patterns of damage or threat to nuclear-armed platforms. India's maritime strategy, for instance, places a heavy emphasis on offensive sea control, as well as on "marking and counter marking" as a means to "clear the cobwebs" in the preliminary phases of conflict.<sup>135</sup>

Going forward, subsurface interactions are liable to become particularly problematic. Andrew Winner, a professor at the U.S. Naval War College, has noted:

Submarine-versus-submarine interactions occur already without any public acknowledgment of increased tensions, but the importance of nuclear weapons may cause both sides to take greater risks both to gather intelligence and to defend a nuclear-armed platform. Similarly, both sides may become more aggressive in patrolling and defending territorial waters, contiguous zones, and even exclusive economic zones if they want to deny the other side from gaining familiarity with a particular stretch of water.<sup>136</sup>

The history of the Cold War is littered with examples of submarine intelligence-gathering operations gone awry, resulting in collisions, accidental groundings, or near confrontations.

A number of key questions about India-Pakistan interactions remain very open and are seldom discussed in either New Delhi or Islamabad. This is cause for concern. As India and Pakistan begin to deploy nuclear-armed submarines, will both navies manage to avoid succumbing to the escalatory pressures tied to such operations? In the event of conflict, would India and Pakistan eschew targeting nuclear-armed or dual-use platforms? If Pakistan engaged an Indian SSBN, or if India destroyed a Pakistani surface ship armed with nuclear-tipped cruise missiles, could strategic stability be preserved?

Greater attention will also need to be paid to naval force disposition and signaling. India is still far from acquiring the capabilities to conduct CASD and to seamlessly maintain SSBNs on deterrent patrol. As a result, it is likely that in times of high tension, New Delhi would surge its undersea nuclear assets from their deepwater ports in the Bay of Bengal.<sup>137</sup> If detected, such a move might be deemed highly provocative by Islamabad and

could invite preemptive conventional action. Indian ASW forces, for their part, may feel a similar pressure to engage in early attrition of Pakistan's conventional attack submarines if they were detected moving close to Indian carrier groups or in the vicinity of major Indian port cities such as Mumbai.

Thomas Schelling famously defined brinkmanship as the manipulation of the shared risk of war.<sup>138</sup> By deliberately cultivating uncertainty and importing tactics of intimidation, weak actors may hope to convincingly deter a more risk-averse opponent from effectively leveraging its conventional superiority. In terms of everyday maritime operations, this can dissuade the stronger naval actor from pressing its claims or maintaining a regular presence in certain areas, out of fear of an isolated incident spiraling out of control.<sup>139</sup> Pakistan has displayed a strong attachment to naval brinkmanship over the years, frequently buzzing Indian naval task forces with maritime aircraft, and in some cases threatening to enter into direct collision with Indian naval ships. Both nations have failed to resolve long-standing maritime boundary issues, and they continue to engage in the systematic detention of fishermen they consider to have violated their territorial waters.<sup>140</sup> The most dramatic incident occurred in 1999, when a Pakistani Dassault-Breguet Atlantic aircraft violated Indian airspace, refused to respond to hails, and was shot down by an Indian Air Force MiG-21.

Such episodes are already fraught with risk under normal conditions, and they become even more hazardous in an environment where dual-use systems have become the norm. Until now, both Indian and Pakistani naval officers have been accustomed to operating within a conventional maritime setting. In the future, the Indian Air Force may have no way of ascertaining whether a straying Pakistani maritime patrol aircraft is carrying nuclear ordnance or not. Accurately fathoming an adversary's intentions is a singularly challenging enterprise.<sup>141</sup> It becomes even more arduous when one player relies on a policy of tactical brinkmanship and naval nuclear coercion to compensate for its conventional inferiority.

Last but not least, the scattering of nuclear assets at sea, particularly aboard surface ships, heightens the risks of an accidental release or of a nuclear weapon's being intercepted by a malevolent nonstate actor. Concerns are already widespread with regard to the security of Pakistan's land-based nuclear inventory. One analyst noted in 2013 that although Pakistan's nuclear arsenal may be relatively well protected in times of peace, this may be far from the case in times of crisis:

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Forced to adopt a more delegative C2 [command-and-control] system during nuclear alerts and operational deployments of nuclear weapons, Pakistan's protection against inadvertent or unauthorized nuclear releases at times of military crises appears rudimentary. The conclusion is bleak: although Pakistan appears able to manage safety during nuclear operations during peacetime, the country remains vulnerable to nuclear mishaps during military crises.<sup>142</sup>

A number of nonstate-actor-related incidents have occurred in recent years. For example, in May 2011, Islamic militants staged a successful attack on the Mehran naval air base in Karachi. More recently, members of the Tehreek-i-Taliban Pakistan attacked a naval dockyard in Karachi. In both cases, the attacks reportedly benefited from support from within the Pakistan Navy itself, which raises concerns over the growth of an insider threat.<sup>143</sup> As such attacks have become more frequent, the Pakistan Navy has begun to transfer the bulk of its operational naval platforms away from the roiling, congested city of Karachi, toward the Jinnah Naval Base in Ormara.<sup>144</sup>

Pakistani vessels anchored in the shallow waters off Karachi or equally cluttered littorals remain acutely vulnerable, however, to suicide attacks or boarding actions by terrorists piloting fast attack craft. If nuclear weapons are placed aboard surface ships, there is a chance they could be perceived as "soft targets" for interception by nefarious nonstate actors or by radicalized elements within the Pakistan Navy itself.

## IMPLICATIONS FOR SURFACE WARFARE

During the Cold War, naval commanders found themselves compelled to operate within an environment where commingling of nuclear and conventional weapons had become the new norm. For India's military planners, however, the progressive nuclearization of the maritime battlespace poses an entirely novel set of operational challenges that will urgently need to be addressed. Unfortunately, the dysfunctional state of India's higher defense management does not provide fertile ground for the blossoming of serious thought on issues such as limited nuclear war, conventional operations under a nuclear overhang, or the mechanics of intra-war escalation. There is little intellectual cross-pollination between the Strategic Forces Command and the Integrated Defense Staff, let alone between the different services. Furthermore, no higher defense learning institution imparts any substantive form of education to military officers on nuclear strategy and operations, and service headquarters continue to plan primarily for conventional war.<sup>145</sup>

The Indian Navy's maritime strategy does note that transition and passage through nuclear fallout areas might "have to be undertaken," but it tempers this assessment with the observation that "a direct nuclear attack on [its] own naval forces is as yet a distant possibility."<sup>146</sup> As Pakistan moves toward the navalization of its deterrent and continues to lower the threshold for nuclear use, this assumption may need to be revised.

At the same time, Indian naval planners will need—much in the vein of their U.S. and Soviet forebears—to put a greater emphasis on anti-nuclear spacing and survivability.<sup>147</sup> A premium will be placed on the ability to rapidly mass or disperse firepower while maintaining fleet connectivity and operational fluidity. In many ways, this will require a greater adherence to some of the core tenets of Sir Julian Corbett regarding fleet concentration. Writing in 1911, the English naval theorist argued that in order to defend themselves from shore-based threats, navies would need

to cover the widest possible area, and to preserve at the same time elastic cohesion, so as to secure rapid condensations of any two or more of the parts of the organism, and in any part of the area to be covered, at the will of the controlling mind; and above all, a sure and rapid condensation of the whole at the strategic center.<sup>148</sup>

Transposed to the operational environment of the twenty-first century, successfully applying Corbett's concept of "elastic cohesion" will require India to continue to enhance the network centrality of its navy and to develop multiple, redundant layers of communication in order to mitigate the indirect effects of a nuclear detonation at sea.<sup>149</sup>

While South Asia's naval nuclearization will affect all areas of maritime competition, India and Pakistan will most likely concentrate the nuclei of their respective sea-based deterrents in the subsurface domain. Anti-submarine warfare is in the midst of a potential revolution, and this, along with China's growing naval presence in the Indian Ocean, could have powerful ramifications for strategic stability in South Asia.





# THE CLOUDED FUTURE OF NAVAL NUCLEAR DYNAMICS IN THE INDIAN OCEAN

**CHINA, IN PARTICULAR,** could play a key role as an enabler for Pakistan's shift toward a coercive naval nuclear posture. The history of Chinese assistance to Pakistan's military programs—both conventional and nuclear—has been well documented.<sup>150</sup> As Pakistan seeks to nuclearize its fleet, it will encounter a number of sizable technological challenges. Chinese assistance could no doubt provide a means of more rapidly alleviating some of these difficulties.

China has also been making progress in the development of its own sea-based deterrent. For a number of reasons, it is doubtful that Chinese SSBNs will engage in extended deterrent patrols west of the Malacca Strait any time soon. Nevertheless, as the People's Liberation Army Navy progressively extends its reach into the Indian Ocean region, Sino-Indian subsurface interactions are likely to become more frequent.

Meanwhile, certain wider technological and military changes risk adding layers of complexity—and unpredictability—to the region's naval nuclear geometry. Indeed, as precision-guided systems continue to proliferate, coastal states have invested in increasingly dense constellations of anti-access and area denial (A2/AD) systems.<sup>151</sup> The growing ability of these states to both locate and destroy mobile targets at extended ranges offshore has raised questions about the continued relevance of high-signature surface vessels, and high-end maritime competition is increasingly being driven into the undersea domain.

Due to steady advances in unmanned and sensor technology, ASW is potentially on the cusp of a significant transformation. This may have some major ramifications, not only in terms of conventional operation constructs, but also with regard to strategic ASW.

## CHINA AS A POTENTIAL ENABLER

China and Pakistan have enjoyed a close relationship since the early 1960s. Since then, Beijing has proven to be the most reliable of Islamabad's partners, providing steady flows of military equipment and economic aid—after the 1965 Indo-Pakistani war, when the United States cut off military aid, and in the late 1990s, when Pakistan was isolated for a variety of reasons (its nuclear proliferation, military-sponsored coup d'état in 1999, and support of the Taliban government in Afghanistan). Beijing actively assisted Islamabad with its nuclear weapons program from the 1980s onward, cooperating in the production of fissile material and in nuclear device design.<sup>152</sup> China has also provided its Pakistani partner with a number of delivery systems, ranging from SRBMs to cruise missiles.<sup>153</sup>

In March 2011, Pakistan's cabinet approved a defense ministry request to purchase six diesel-electric submarines from China. Due primarily to a lack of funding, the acquisition has been held in abeyance. In early 2014, however, senior Pakistani officials intimated that the deal was nearing completion.<sup>154</sup> It remains unclear whether the platform in question would be of the Yuan class or of the larger Qing class. In both cases, the submarines would be fitted with air-independent propulsion, allowing them to remain submerged for longer periods of time than India's conventional submarines, which have yet to be fitted with such a capability. They would also be equipped with long-range anti-ship cruise missiles that could potentially be mated with miniaturized nuclear warheads.<sup>155</sup>

Beijing might also choose to provide Pakistan with assistance in modifying the Babur missile for its Agosta-class conventional attack submarines. As Arun Prakash has observed,

the concern is not so much about Pakistan's ambitions. . . . The real concern is about the cynical and unprincipled attitude of the Chinese, which has led them to support and sustain the Pakistani nuclear weapons program—in defiance of international norms—with the sole aim of destabilizing the subcontinent and keeping India off-balance. The Babur is most likely a Chinese DH-10 painted in Pakistani colors. A navalization of the Babur will mean modifying it for launch from the 533-millimeter torpedo tube of an Agosta submarine. Modifying a missile for underwater launch and interfacing its [Chinese] guidance-control with the submarine's [French] fire-control system would be a

huge challenge, but the Chinese could do it. Any such development would obviously add to tensions in the Arabian Sea, with strategic ASW becoming a central theme.<sup>156</sup>

Chinese assistance could also be extremely useful—and deemed less provocative—in the development of supporting infrastructure for Pakistan’s unconventional sea-based deterrent, whether through the construction of VLF and ELF stations or over-the-horizon radars, or through the provision of additional anti-ship cruise missile batteries to help protect Pakistan’s principal maritime approaches.

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**Chinese assistance could also be extremely useful in the development of supporting infrastructure for Pakistan’s unconventional sea-based deterrent.**

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## CHINA AS A POTENTIAL STRATEGIC ACTOR

Although Beijing launched its first SSBN, known as the Type 092 or Xia class, over three decades ago, the maturation of its sea-based deterrent has occurred at a remarkably leisurely pace. China appears to have opted for an incrementalist approach—working to progressively improve the quality of its sea-based deterrent through platform experimentation rather than focusing on immediate deployment. In 2014, the U.S. Department of Defense reported that with three Jin-class SSBNs operational and the expected induction of the JL-2 SLBM, China could finally be expected to start conducting its first deterrent patrols.<sup>157</sup>

However, even with these missiles, such patrols could be limited. With a range of approximately 7,400 kilometers (about 4,600 miles), the JL-2 can only target the western coast of the United States. In order to continuously target the United States’ eastern cities, China’s SSBN force would need to engage continuously in extended deterrent patrols beyond what Beijing calls the first island chain.<sup>158</sup> As a result, Avery Goldstein, a professor of global politics at the University of Pennsylvania, notes

the Chinese would . . . face tough choices early on. They could risk the loss of submarines by running the gauntlet, or they could keep the submarines in their relatively safe coastal waters, but only by sacrificing much of their coercive value.<sup>159</sup>

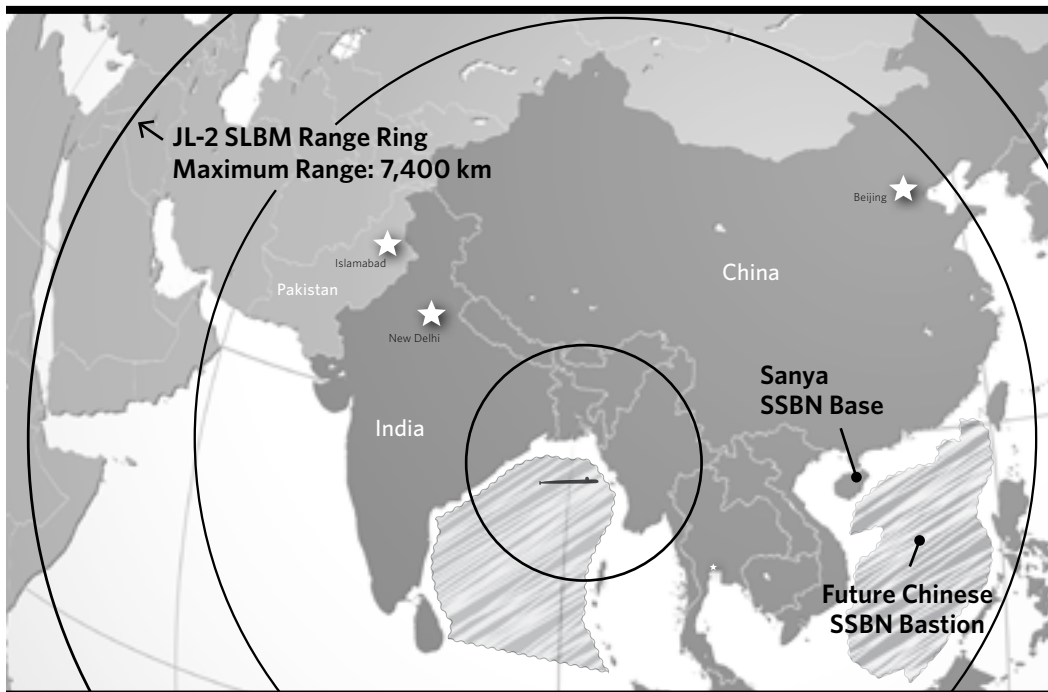
This unfortunate combination of disadvantageous maritime geography and vulnerable platforms has led some analysts, such as James Holmes and Toshi Yoshihara, to suggest

that China may replicate the Soviet Union’s bastion strategy of the 1970s and 1980s, whereby SSBNs remain confined within the geographic redoubts of their near seas, never venturing out into more remote and unfriendly waters.<sup>160</sup>

Absent rapid strides in quieting technology, China may find itself compelled to adopt such a nuclear force disposition. In that case, it would also need to master the technological challenge of developing an SLBM with a range of over 11,000 kilometers (about 6,800 miles) in order to reach the United States’ eastern seaboard.<sup>161</sup>

China’s SSBN force does not face the same operational quandaries when it comes to safely targeting India. Indeed, once fitted with the JL-2 SLBM, Jin-class SSBNs can comfortably target India’s main cities from the waters of the South China Sea (see figure 3). There is little likelihood, therefore, that Chinese SSBNs would seek to engage in deterrent patrols west of the Malacca Strait.

FIGURE 3



In the years ahead, Sino-Indian naval nuclear tensions are thus more likely to result from perceived bastion violations by each nation’s nonstrategic naval platforms. Both countries appear to be increasingly animated by the desire to secure and sanitize the waters surrounding their SSBN staging points. In China’s case, this is a highly problematic

endeavor, as Hainan, where its SSBN fleet is stationed, is located at the very heart of a heavily trafficked and contested maritime region.<sup>162</sup> Furthermore, despite China's best efforts, the United States' unparalleled proficiency in ASW will no doubt continue to pose a serious threat to China's noisy SSBN fleet for many years to come.<sup>163</sup>

In India's case, the Bay of Bengal would appear to form a strategic space highly amenable to maritime bastion development.

India remains the most powerful naval actor in the subregion by a wide margin, and its growing military presence on the Andaman and Nicobar Islands will allow it to more effectively monitor—and potentially deny—eastern axes of approach.<sup>164</sup> As Verghese Koithara has noted,

India's great advantage in its quest for sea-based deterrence is that it will not have to—unlike Russia and China—confront the ASW capabilities of the US. This confers on India an inestimable strategic benefit, which is accentuated by the fact that China cannot expect to develop any ASW capability of consequence in the Indian Ocean in the face of the US's global maritime dominance, and India's growing maritime capability. . . . India has untrammelled access to deep ocean from its long peninsular coasts, unlike Russia and China, whose ports are hemmed in by the maritime forces of the US and its allies.<sup>165</sup>

In a similar vein, at a 2014 event held at a think tank based in Washington, DC, Vice Admiral Vijay Shankar, the former commander in chief of India's Strategic Forces Command, remarked that India's sea-based deterrent would eventually be "secured in havens, waters we are pretty sure of, by virtue of the range of the missiles. We will be operating in a pool in our own maritime backyard."<sup>166</sup>

Meanwhile, India and China have been steadily increasing the scale and frequency of their conventional naval deployments throughout the Indo-Pacific region. India has become a regular naval presence in East Asian waters under the aegis of its Look East policy and the growing strength of its relations with countries ranging from Vietnam to Australia and Japan. China, for its part, has maintained a steady rotation of anti-piracy naval task forces in the Gulf of Aden, and it has reportedly begun to deploy nuclear attack submarines on reconnaissance missions in the Indian Ocean.<sup>167</sup> As both countries continue to enlarge and modernize their SSBN fleets, they will no doubt seek, in parallel, to more aggressively expand their intelligence-gathering activities. This could lead to heightened competition not only within the physical maritime domain but also in the realm of cyberwarfare.<sup>168</sup>

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**In the years ahead, Sino-Indian naval nuclear tensions are more likely to result from perceived bastion violations by each nation's nonstrategic naval platforms.**

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## THE TRANSFORMATION OF ASW AND ITS POTENTIAL RAMIFICATIONS

For much of the Cold War, the primary threat for an SSBN commander was the nuclear-powered attack or hunter-killer submarine. SSNs were often equally quiet, if not more so, and they could occupy the same portion of the oceans as their quarry, thus avoiding the abbreviation of sonar range caused by the ocean inversion layers and the ever-changing seasonal thermocline. Furthermore, they could trail an SSBN at high speed almost indefinitely and were large enough to accommodate extensive sonar arrays, processors, and a large quantity of anti-submarine weaponry. In short, an SSN constituted the most “powerful integrated ASW system that can detect, follow, localize and destroy another submarine.”<sup>169</sup>

This remains true to this day, but ongoing developments in unmanned and sensor technology risk multiplying the sources of threat to SSBNs and rendering the undersea environment, particularly in littoral waters, altogether more contested.

In the future, it is likely that states will increasingly seek to invest in extensive undersea combat networks that are powered from land and composed of intricate, tightly connected systems of unmanned underwater vehicles (UUVs) and sensors.<sup>170</sup> Instrumented netting covering large areas could quickly report any subsurface intrusion, and, if weaponized, could automatically vector a weapon to attack the submarine in question. Vice Admiral Michael Connor, the commander of the U.S. Navy’s submarine forces, has written that as weapons grow more sophisticated, “the torpedo of the future and the offensive mine of the future will be hard to distinguish.”<sup>171</sup> Naval analysts have begun to envision undersea systems of systems, composed of large mother submarines serving as underwater carriers for large-diameter, torpedo-carrying UUVs.<sup>172</sup> Underwater gliders, such as China’s Haiyan-class UUV, also have the ability to conduct much wider-area ASW than air-dropped sonobuoys, and they can carry a wide array of different sensor types.<sup>173</sup> The U.S. Defense Advanced Research Projects Agency’s (DARPA’s) Upward Falling Payloads concept envisions the dispersal of payloads concealed within the ocean floor, which could be remotely activated to “fall upward” toward the surface.<sup>174</sup>

What are the potential ramifications of such developments for strategic anti-submarine warfare, particularly in the South Asian context? The impact of the spread of unmanned technologies on crisis stability and escalation control is one of growing importance that remains relatively underexplored in the security studies literature. The implications appear particularly significant in the Asian maritime domain, where conventional and nuclear-armed platforms are most likely to frequently interact.

The spread of undersea combat networks will render certain littorals increasingly impenetrable for manned submarines, whether nuclear or conventional. This will no doubt

benefit states such as India and China, which appear naturally inclined to pursue bastion strategies by pushing strategic submarine operations further from the coast.

At the same time, it will accentuate difficulties for countries such as Pakistan, whose conventional submarines are ill-suited for extended deterrent patrols and whose short missile range, if it wishes to credibly threaten a variety of land-based targets, dictates that it patrol in close proximity to India's coastline. This, in turn, could accentuate Pakistan's "use or lose them" pressures in times of crisis. As UUVs come to play an increasingly central role in strategic ASW operations, countries like Pakistan, which do not have the means or technological infrastructure to continuously innovate in the field of robotics, may find themselves struggling to compete.<sup>175</sup>

Naval commanders wishing to engage in forward operations within an opponent's near sea may be increasingly reticent to hazard expensive manned platforms such as submarines, preferring instead to deploy swarms of UUVs and underwater decoys to saturate and overwhelm defensive networks. Something of a paradox might then emerge, whereby submarine commanders grow more cautious in the deployment of expensive manned platforms but more aggressive in the use of unmanned systems for scouting, sabotage, and ASW operations. Experts have also commented on the development by multiple countries of long-duration unmanned tracking vessels for ASW missions, noting that the use of such platforms has the potential to be highly detrimental to crisis stability.<sup>176</sup> This is particularly true in Asia, where naval nuclear actors will be operating relatively small fleets of SSBNs out of only a handful of locations, unlike during the height of the Cold War.





# CONCLUSION

**THE PRESENT PERIOD** offers a precious window of opportunity for both New Delhi and Islamabad to shape, rather than be shaped, by the emerging naval nuclear regime in South Asia. India and Pakistan are in the midst of a fundamental transformation of their nuclear architectures. As both nations seek to horizontally expand their nuclear arsenals from land to sea, they will be confronted by a daunting array of doctrinal and technological challenges. Neither country's maritime deterrents are likely to be fully operational until the end of the 2010s, if not later. India's sea-based leg is only slowly materializing after many decades of effort, whereas Pakistan's remains, as of early 2015, in an embryonic phase.

A number of ongoing developments have the potential to be highly destabilizing. If Pakistan chooses to maintain its current trajectory and subscribe to a coercive naval nuclear posture, this could have dire implications for crisis stability. Escalation control could prove increasingly arduous, and violent nonstate actors may gain easier access to pre-mated nuclear weapons. Considering the potential gravity of such a situation, Beijing may wish to maintain a greater distance from Pakistan's military nuclear enterprise.

Meanwhile, India's nuclear management would no doubt gain from clearer communication and greater transparency, particularly with regard to the Dhanush program, which serves no useful operational purpose and has the potential to be destabilizing. As a former head of India's Strategic Forces Command noted in a recent article, a more proactive

public communications campaign would serve many useful functions. Not only would it help reassure an often ill-informed Indian public, but it would also dispel potentially damaging misperceptions and improve nuclear signaling, thus strengthening crisis stability. In this light, it would no doubt prove judicious to periodically issue an official, publicly available document on India's nuclear policy and deterrence posture.<sup>177</sup>

Last but not least, Cold War literature provides a wealth of instructive material on all manner of issues pertaining to naval nuclear operations. This is also true with regard to the history of naval arms control and confidence-building measures in the maritime domain. Over the past decade, India's and Pakistan's coast guards have enacted a number of such measures that naval officers from both countries have described to this author in highly positive terms.<sup>178</sup> Going forward, decisionmakers in New Delhi and Islamabad might consider extending initiatives such as a direct hotline to their navies as well.<sup>179</sup>

While the Pakistan Navy has long subscribed to a policy of ambiguity and brinkmanship, there is evidence that a constituency within the service would look favorably on a less volatile maritime environment. Indeed, one Pakistani naval officer, writing in 2012, described the 1972 Incidents at Sea Agreement as

the perfect example for Pakistan and India to understand each other's problems in a professional manner, to develop trust and cooperation between naval forces, respect each other's sovereignty, and of course avoid sea skirmishes and both intentional and unintentional accidents.<sup>180</sup>

As Mark Twain once quipped, "History may not repeat itself, but it certainly does rhyme." South Asia's security environment may suffer from its own specific maladies, but many of the challenges linked to sea-based deterrence have been chronicled and strenuously debated by past generations. This report has tried to highlight the importance of these writings in the hope that brighter minds within South Asian naval academies will be encouraged to delve into greater depths.





# NOTES

- 1 This report draws on an article on a similar topic published in 2012. See Iskander Rehman, “Drowning Stability: The Perils of Naval Nuclearization and Brinkmanship in the Indian Ocean,” *Naval War College Review* 65, no. 4 (2012): 64–88.
- 2 For a good discussion of naval nuclear dynamics in the Indian Ocean during the Cold War, see Selig Harrison and K. Subrahmanyam, eds., *Superpower Rivalry in the Indian Ocean: Indian and American Perspectives* (New York: Oxford University Press, 1989).
- 3 Both India and Pakistan announced their intent to formally join the ranks of military nuclear powers by conducting a series of nuclear tests (the Pokhran-II and Chagai-I tests) in May 1998.
- 4 Rajat Pandit, “Move to Fast-Track Two Submarine Projects Gathers Steam,” *Times of India*, July 14, 2014, <http://timesofindia.indiatimes.com/india/Move-to-fast-track-two-submarine-projects-gathers-steam/articleshow/38342676.cms>.
- 5 Andrew Winner has done some excellent work on naval nuclear dynamics in South Asia. See Andrew C. Winner, “The Future of India’s Undersea Deterrent,” in *Strategy in the Second Nuclear Age: Power, Ambition and the Ultimate Weapon*, ed. Toshi Yoshihara and James R. Holmes (Washington, DC: Georgetown University Press, 2012), 161–81.
- 6 For two strong arguments in favor of the continued relevancy of certain writings from the Cold War, see James M. Acton, “On Not Throwing the Nuclear Strategy Baby Out With the Cold War Bath Water,” in *Challenges in U.S. National Security Policy: A Festschrift Honoring Edward L. (Ted) Warner*, ed. David Ochamek and Michael Sulmeyer (Santa Monica, CA: RAND Corporation, 2014), 107–121; and Therese Delpech, *Nuclear Deterrence in the 21st Century*:

*Lessons From the Cold War for a New Era of Strategic Piracy* (Santa Monica, CA: RAND Corporation, 2012).

- 7 The diverse motivations behind second-ranking powers' quests for an independent nuclear deterrent have been explored in depth by Avery Goldstein, who concludes, among other things, that "states facing highly capable adversaries—prospective foes with conventional superiority or armed with nuclear, biological or chemical weapons—are unlikely to be satisfied with the dissuasive effects of conventional forces and are more likely to be prepared to pay the price necessary to undertake a nuclear weapons development effort." See Avery Goldstein, *Deterrence and Security in the 21st Century: China, Britain, France and the Enduring Legacy of the Nuclear Revolution* (Stanford, CA: Stanford University Press, 2000), 262. For an excellent, and more recent, overview of regional power nuclear strategies, see Vipin Narang, *Nuclear Strategy in the Modern Era: Regional Powers and International Conflict* (Princeton, NJ: Princeton University Press, 2014).
- 8 For a definitive history of India's nuclear weapons program, see George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Oakland, CA: University of California Press, 2002). For an analysis of both countries' decisions to cross the nuclear threshold in 1998, see Scott Sagan, ed., *Inside Nuclear South Asia* (Stanford, CA: Stanford University Press, 2009), 296. For a good history of Pakistani motivations, see Samina Ahmed, "Pakistan's Nuclear Weapons Program: Turning Points and Nuclear Choices," *International Security* 23, no. 4 (Spring 1999): 178–204.
- 9 See the Indian National Security Advisory Board's "Draft Report of National Security Advisory Board on Indian Nuclear Doctrine," August 17, 1999, <http://meaindia.nic.in/disarmament/dm17aug99.htm>; and the January 4, 2003, press release entitled "Cabinet Committee on Security's Review of the Operationalization of India's Nuclear Doctrine."
- 10 See Arpit Rajain, *Nuclear Deterrence in Southern Asia, China, India and Pakistan* (New Delhi: Sage Publications, 2005), 243. For the references to India's need for a sea-based deterrent in the 2004 and 2009 iterations of India's Maritime Doctrines, see Integrated Headquarters (Indian Navy), *Indian Maritime Doctrine 2004*, New Delhi, 49, Integrated Headquarters (Indian Navy), *Freedom to Use the Seas: India's Maritime Military Strategy*, New Delhi, 76, Integrated Headquarters (Indian Navy), *Indian Maritime Doctrine 2009*, New Delhi, 93.
- 11 For a closer examination of the role of prestige in the Indian Navy's acquisitions, see Iskander Rehman, "The Indian Navy's Doctrinal and Organizational Evolution," in Harsh Pant, ed., *The Rise of the Indian Navy, Problems and Prospects* (Farnham: Ashgate, 2012).
- 12 *Indian Maritime Doctrine 2004*, 50.
- 13 See "Giant Stride for Country, Says PM on Nuclear Reactor INS Arihant," *Hindu*, August 10, 2013, [www.thehindu.com/sci-tech/science/giant-stride-for-country-says-pm-on-nuclear-reactor-ins-arihant/article5009098.ece?ref=relatedNews](http://www.thehindu.com/sci-tech/science/giant-stride-for-country-says-pm-on-nuclear-reactor-ins-arihant/article5009098.ece?ref=relatedNews).
- 14 Eight years before the unveiling of the ATV, Indian naval analyst Vijay Sakhuja listed several "formidable capabilities" that SSBNs could offer Indian national decisionmakers: responsiveness, flexibility, survivability, endurance, connectivity, and readiness. For more, see Vijay Sakhuja, "Sea-Based Deterrence and Indian Security," *Strategic Analysis* 25, no. 1 (2001): 21–32.

- 15 Vijay Sakhuja, "Missile Developments in China, India and Pakistan: A Burgeoning Missile Race," *China Brief* 10, (Washington, DC: Jamestown Foundation, 2010).
- 16 Jonathan Holslag, "China, India and the Military Security Dilemma," Brussels Institute of Contemporary China Studies Background Paper 3, no. 5, 2008, 28, [www.vub.ac.be/biccs/documents/APaper\\_BICCS\\_2008\\_China%20India%20Security%20Dilemma.pdf](http://www.vub.ac.be/biccs/documents/APaper_BICCS_2008_China%20India%20Security%20Dilemma.pdf).
- 17 Verghese Koithara, *Managing India's Nuclear Forces* (Washington, DC: Brookings Institution Press, 2012), 121.
- 18 Arun Prakash, *India's Nuclear Deterrent: The More Things Change . . .* (Singapore: S. Rajaratnam School of International Studies, 2014), 6. While there is no doubt that quiet nuclear submarines are universally considered to be the most survivable form of a second-strike platform, Koithara and Prakash may be slightly overstating their case. History has shown that it can be extremely difficult to locate and prosecute road- or rail-mobile missiles, particularly over large tracts of territory. For a seminal discussion of these challenges, see Alan J. Vick et al., *Aerospace Operations Against Elusive Ground Targets* (Santa Monica, CA: RAND Corporation, 2001).
- 19 Raja Menon, a retired rear admiral, thus posits that "once the SSBN force is deployed, deterrence will become less dependent on the size of the Indian arsenal, because it will become unnecessary to calculate counter-force and first strike destruction figures." See Raja Menon, *A Nuclear Strategy for India* (New Delhi: SAGE Publications, 2000), 228.
- 20 Suni Khilnani et al., *Nonalignment 2.0: A Foreign and Strategic Policy for India in the Twenty-First Century* (New Delhi: Center for Policy Research, 2012), 54–55.
- 21 See Mark Gorwitz, "The Indian Strategic Nuclear Submarine Project: An Open Literature Analysis," Washington, DC: Federation of American Scientists, 1996, [www.fas.org/nuke/guide/india/sub/ssn/index.html](http://www.fas.org/nuke/guide/india/sub/ssn/index.html).
- 22 "India's ATV SSBN Submarine Project," [www.defenseindustrydaily.com/indias-atv-ssn-submarine-project-04374/](http://www.defenseindustrydaily.com/indias-atv-ssn-submarine-project-04374/); and "India's Nuclear Sub," *Nation*, March 28, 2007.
- 23 Pandit, "Move to Fast-Track Two Submarine Projects Gathers Steam."
- 24 In 2012, India inducted the INS *Chakra*, an 8,000-ton, Akula-II-class SSN on a ten-year lease from Russia. There have been persistent rumors that the former United Progress Alliance government, led by then prime minister Manmohan Singh, began negotiations with Russia regarding the potential lease of a second Akula, partially in order to help mitigate the steady hemorrhaging of its subsurface fleet. The Akulas, while nuclear-powered, will not be nuclear-armed, as this would be strictly prohibited under the Missile Technology Control Regime. For India's purported move to acquire a second SSN from Russia, see Rahul Bedi, "India, Russia in Talks Over Second SSN Lease," *Jane's Defence Weekly*, October 21, 2013; and "Manmohan in Moscow: India May Lease Second Nuclear Submarine From Russia," *India Today*, October 20, 2013, <http://indiatoday.intoday.in/story/manmohan-in-russia-second-nuclear-submarine-on-lease/1/317212.html>.
- 25 See Raja Menon, "Just One Shark in the Deep Blue Ocean," *Outlook*, August 10, 2009, [www.outlookindia.com/article/Just-One-Shark-In-The-Deep-Blue-Ocean/261048](http://www.outlookindia.com/article/Just-One-Shark-In-The-Deep-Blue-Ocean/261048).



- 26 Manoj K. Das, "India Begins Work on Second Nuclear Submarine," *Asian Age*, July 10, 2011, <http://archive.asianage.com/india/india-begins-work-2nd-nuclear-submarine-184>.
- 27 See Lawrence Freedman, *The Evolution of Nuclear Strategy*, 3rd ed. (New York: Palgrave Macmillan, 2003), 158.
- 28 Author's interview with Admiral Sushil Kumar, Noida, India, December 2012.
- 29 In addition to India's SSBN project, there have been reports that the country eventually wants to construct up to six SSNs indigenously, "using expertise gained in the construction of the SSBNs." See Pandit, "Move to Fast-Track Two Submarine Projects Gains Steam."
- 30 Author's correspondence with Ravi Ganesh, September 2014.
- 31 Rajat Pandit, "Post-Accident, Lens on Nuclear Submarine Project," *Times of India*, March 10, 2014, <http://timesofindia.indiatimes.com/india/Post-accident-lens-on-nuclear-submarine-projects/articleshow/31758017.cms>.
- 32 Gaurav Vivek Bhatnagar, "Major Acquisitions for Navy, Army Approved," *Hindu*, December 25, 2013, [www.thehindu.com/todays-paper/tp-national/tp-newdelhi/major-acquisitions-for-navy-army-approved/article5499523.ece](http://www.thehindu.com/todays-paper/tp-national/tp-newdelhi/major-acquisitions-for-navy-army-approved/article5499523.ece).
- 33 For "technology demonstrator," see Commander Ranjit Rai (retd.) "Why India Needs to Opt for Nuclear Submarines," *India Strategic*, October 2010, <http://www.indiastrategic.in/topstories765.htm>.
- 34 Sandeep Unnithan, "INS Arihant to Sail on Deterrent Patrol After Commissioning," *India Today*, December 2, 2010, <http://indiatoday.intoday.in/story/ins-arihant-to-sail-on-deterrent-patrol-after-commissioning/1/121885.html>.
- 35 See, for example, Arun Prakash, "India's K-15 Launch and the Dangers Beyond," *Gulf News*, January 30, 2013, <http://gulfnews.com/opinions/columnists/india-s-k-15-launch-and-the-dangers-beyond-1.1139370>.
- 36 Judging from measurements on Google Earth, the *Arihant* would need a strike range of at least 1,400 kilometers (about 870 miles) to credibly threaten Islamabad from the northwestern quadrant of the Arabian Sea.
- 37 See Arun Prakash, "A Step Before the Leap," *Force*, September 2009, <http://forceindia.net/FORCEINDIAOLDISSUE/arunprakash12.aspx>. See also S. Anandan, "INS Arihant May be of Limited Utility," *Hindu*, December 21, 2014, [www.thehindu.com/news/national/ins-arihant-may-be-of-limited-utility/article6709623.ece](http://www.thehindu.com/news/national/ins-arihant-may-be-of-limited-utility/article6709623.ece).
- 38 See "India Tests New Underwater Nuclear Missile," *Times of India*, March 26, 2014, <http://timesofindia.indiatimes.com/india/India-tests-new-underwater-nuclear-missile/article-show/32694060.cms>; and David C. Isby, "India's K-4 SLBM Awaits First Launch," *Jane's Missiles and Rockets*, August 28, 2013.

- 39 Raja Menon, discussing the *Arihant's* 10-meter diameter, notes that “the Russians were unable to confine an ICBM within a 12-meter hull and so their missile tubes protruded two meters outside the pressure hull. The future of India’s nuclear submarine is entirely in the hands of the rocket scientists.” Menon, “Just One Shark in the Deep Blue Ocean.”
- 40 Arjun Subramanian, “The Emerging Sea-Based Nuclear Deterrence Capabilities of China and India,” *Asian Defense Review* (New Delhi: Center for Air Power Studies, 2014).
- 41 Prakash, “A Step Before the Leap.”
- 42 One Indian defense journalist estimated that it could take even longer, claiming that “it is only when the S-5 vessel with a new design and a powerful nuclear reactor is launched, which could be two decades away, can India hope to have a semblance of sea-based deterrence against China.” See Pravin Sawhney and Vijay Shankar, “Is the Navy’s Newest Sub Worth the Price?” *Hindu*, April 5, 2012, [www.thehindu.com/opinion/op-ed/is-the-navys-newest-sub-worth-the-price/article2829121.ece](http://www.thehindu.com/opinion/op-ed/is-the-navys-newest-sub-worth-the-price/article2829121.ece).
- 43 Ajai Shukla, “New Naval Base for Nuclear Subs, Aircraft Carrier, Coming Up Near Visakhapatnam,” *Business Standard*, August 27, 2014, <http://ajaiashukla.blogspot.com/2014/08/new-naval-base-for-nuclear-subs.html>.
- 44 See Rahul Bedi, “Indian Navy Plans New Carrier, SSBN Base in Bay of Bengal,” *Jane’s Defence Weekly*, August 31, 2014, [www.janes.com/article/42605/indian-navy-plans-new-carrier-ssbn-base-in-bay-of-bengal](http://www.janes.com/article/42605/indian-navy-plans-new-carrier-ssbn-base-in-bay-of-bengal).
- 45 See Vice Admiral G. M. Hiranandani, *Transition to Guardianship: The Indian Navy 1991–2000* (New Delhi: Lancer Publishers, 2013).
- 46 According to *Jane’s Intelligence Review*, until the addition of the two new transmitter towers, the station was operating between 50 and 200 bits a second, whereas now it operates at over 300 bits a second. See “Open Channels—India Expands Its Naval Communications,” *Jane’s Intelligence Review*, April 9, 2013.
- 47 James Hardy, “India Makes Headway With ELF Site Construction,” *Jane’s Defence Weekly*, March 1, 2013.
- 48 “Navy to Get 2,900 Acres in Telangana,” *Hindu Business Line*, July 21, 2014, [www.thehindu-businessline.com/news/states/navy-to-get-2900-acres-in-telangana/article6234188.ece](http://www.thehindu-businessline.com/news/states/navy-to-get-2900-acres-in-telangana/article6234188.ece).
- 49 Ashton Carter, writing in the 1980s, expounded on this issue: “Under the circumstances in which submarines are crucial—a comprehensive attack on bombers and ICBMs—there is no reason to expect these fixed transmitters to survive. Airbases that are home to the TACAMO airborne relays will also come under attack. The number of TACAMO that would survive attack, the period of time during which they could maintain airborne service, and the extent of their service therefore all depend on their alert status at the time of the strike and on assumptions about Soviet methods of attack.” Ashton B. Carter, “Assessing Command System Vulnerability,” in *Managing Nuclear Operations*, ed. Ashton B. Carter, John D. Steinbruner, and Charles A. Zraket (Washington, DC: Brookings Institution Press, 1987), 604.

- 50 Author's correspondence with retired Admiral Arun Prakash, September 2014.
- 51 "Dhanush, Weapons: Naval," *IHS Jane's*, April 8, 2014.
- 52 Hemant Kumar, "N-Capable Dhanush Successfully Test-Fired," *New Indian Express*, November 23, 2013, [www.newindianexpress.com/states/odisha/N-capable-Dhanush-successfully-test-fired/2013/11/23/article1906868.ece](http://www.newindianexpress.com/states/odisha/N-capable-Dhanush-successfully-test-fired/2013/11/23/article1906868.ece).
- 53 For the surface-based component, the issue is less pressing, as institutional separation and control could be maintained through the presence of civilian representatives on board.
- 54 Narang, *Nuclear Strategy in the Modern Era*, 105.
- 55 Author's correspondence with retired Admiral Arun Prakash, September 2014.
- 56 For a detailed study of Pakistan's nuclear posture, see Vipin Narang, "Posturing for Peace? Pakistan's Nuclear Postures and South Asian Stability," *International Security* 34, no. 3 (2010): 38–78. Narang argues that Pakistan shifted from a catalytic nuclear posture to an asymmetric nuclear posture following India's nuclear tests in 1998. Other analysts still view Pakistan's nuclear behavior as being strongly catalytic, rather than solely asymmetric. Dhruva Jaishankar, for instance, views Pakistan's recent decision to accelerate its weapons production just as its relations with Washington deteriorated as a response to catalytic imperatives, arguing in colorful language that "like the wiles of a deranged lover, this form of masochistic extortion provides a guarantee for Pakistan against abandonment by Washington." See Dhruva Jaishankar, "Up an Atom: The Real Reasons to Worry About Pakistan's Growing Nuclear Stockpile," German Marshall Fund of the United States, *Expert Commentary* (blog), February 23, 2011, <http://blog.gmfus.org/2011/02/up-an-atom-the-real-reasons-to-worry-about-pakistans-growing-nuclear-weapon-stockpile>.
- 57 Commander Muhammad Azam Khan, Pakistan Navy (retd.), "S-2: Options for the Pakistan Navy," *Naval War College Review* 63, no. 3 (2010): 85–104.
- 58 Quoted in Paolo Cotta-Ramusino and Maurizio Martellini, "Nuclear Safety, Nuclear Stability, and Nuclear Strategy in Pakistan: A Concise Report of a Visit by Landau Network Centro Volto," January 14, 2002, [www.pugwash.org/september11/pakistan-nuclear.htm](http://www.pugwash.org/september11/pakistan-nuclear.htm).
- 59 Feroz Khan, a former Pakistan Army brigadier who served in the Strategic Plans Division, has outlined the logic behind Pakistan's embrace of ambiguity in the following terms: "By declaring the red line, what you are indicating to them is that 'up to this point it is fair; you can come and beat me up.' . . . This is not acceptable. . . . By declaring red lines, Pakistan erodes the deterrent value of its nuclear weapons." See Feroz Hassan Khan's comments in Martin Schram, *Avoiding Armageddon: Our Future. Our Choice* (New York: Basic Books, 2003), 53.
- 60 See Basit's comments in "Indian N-Sub Detrimental to Regional Peace," *Dawn*, July 28, 2009, [www.dawn.com/news/853249/indian-n-sub-detrimental-to-regional-peace-fo](http://www.dawn.com/news/853249/indian-n-sub-detrimental-to-regional-peace-fo); and "India Submarine Threatens Peace," BBC News, July 28, 2009, <http://news.bbc.co.uk/2/hi/8171715.stm>.
- 61 Khan, "S-2: Options for the Pakistan Navy," 85–104; and Commander Muhammad Azam Khan, "The Indian Undersea Nuclear Deterrence and Pakistan Navy," *IPRI Journal* 10, no. 2 (2010): 89–111.

- 62 See “Pakistan May Install Nuclear Missiles on Its Subs,” *Los Angeles Times*, February 23, 2001; and Catherine Philp, “India Stokes the Fires With New Missile Test,” *Times*, January 10, 2003.
- 63 “Naval Chief Inaugurates Naval Strategic Forces Headquarters,” Pakistan Inter Services Public Relations, May 19, 2012, [www.ispr.gov.pk/front/main.asp?o=t-press\\_release&cid=2067](http://www.ispr.gov.pk/front/main.asp?o=t-press_release&cid=2067). See also Usman Ansari, “Pakistan Acknowledges Sea-Based Nuclear Deterrent,” *Defense News*, May 23, 2013, [www.defensenews.com/article/20120523/DEFREG03/305230004/Pakistan-Acknowledges-Sea-Based-Nuclear-Deterrent](http://www.defensenews.com/article/20120523/DEFREG03/305230004/Pakistan-Acknowledges-Sea-Based-Nuclear-Deterrent).
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- 65 Author’s conversation with Pakistani military officials, November 2012.
- 66 See “Country Profiles: Pakistan,” Nuclear Threat Initiative, [www.nti.org/country-profiles/pakistan/nuclear](http://www.nti.org/country-profiles/pakistan/nuclear).
- 67 Mansoor Ahmed, *Security Doctrines, Technologies and Escalation Ladders: A Pakistani Perspective* (Monterey, CA: Center on Contemporary Conflict, 2012), [www.isn.ethz.ch/Digital-Library/Publications/Detail/?lng=en&cid=142881](http://www.isn.ethz.ch/Digital-Library/Publications/Detail/?lng=en&cid=142881).
- 68 Khan, “S-2: Options for the Pakistan Navy.”
- 69 “Hatf 7 (Babur),” *Jane’s Strategic Weapons Systems*, July 14, 2014.
- 70 Feroz Hassan Khan, *Eating Grass: The Making of the Pakistani Bomb* (Stanford, CA: Stanford University Press, 2012), 380.
- 71 Usman Ansari, “Pakistan Navy Test-Fires Land-Attack Missile,” *Defense News*, December 21, 2012, [www.defensenews.com/article/20121221/DEFREG04/312210004/Pakistan-Navy-Test-fires-Land-Attack-Missile](http://www.defensenews.com/article/20121221/DEFREG04/312210004/Pakistan-Navy-Test-fires-Land-Attack-Missile).
- 72 *Freedom to Use the Seas: India’s Maritime Military Strategy*, 23.
- 73 Triadic deterrence differs somewhat from standard definitions of deterrence, as it “blends deterrence, which seeks to persuade an adversary not to take a certain action, and compellence, which tries to coerce an adversary to stop taking an unwanted action or to begin taking a wanted action.” See Boaz Atzili and Wendy Pearlman, “Triadic Deterrence: Coercing Strength, Beaten by Weakness,” *Security Studies* 21, no. 2 (2012): 304.
- 74 Indeed, approximately 95 percent of Pakistan’s total trade is seaborne in origin, and trade constitutes close to 40 percent of the nation’s GDP.
- 75 Moeed Yusuf, “Pakistan’s View of Security in the Indian Ocean,” in *Deep Currents and Rising Tides: The Indian Ocean and International Security*, ed. John Garofano and Andrea J. Dew (Washington, DC: Georgetown University Press, 2013), 142.
- 76 See “Pakistan: Country Overview/Data,” U.S. Energy Information Administration, August 2014, [www.eia.gov/countries/country-data.cfm?fips=pk](http://www.eia.gov/countries/country-data.cfm?fips=pk).

- 77 Lt. Commander Raja Rab Nawaz, *Maritime Strategy in Pakistan* (Monterey, CA: Naval Postgraduate School, 2004), 65, [www.researchgate.net/publication/235089323\\_Maritime\\_Strategy\\_in\\_Pakistan](http://www.researchgate.net/publication/235089323_Maritime_Strategy_in_Pakistan).
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- 79 Coercive escalation can be described as using “a deliberate increase in the level of violence as a strategic signal. The actual damage inflicted as a result of the escalation is less important than what it communicates to the opponent about the initiator’s resolve and about the risks of continued aggression. This form of escalation is ‘coercive’ because it uses an expansion in violence to deter an opponent from taking additional actions or to compel an opponent to take particular actions, such as changing war aims, withdrawing forces, or seeking a negotiated settlement.” See Kerry M. Kartchner and Michael S. Gerson, “Escalation to Limited Nuclear War in the 21st Century,” in *On Limited Nuclear War in the 21st Century*, ed. Jeffrey A. Larsen and Kerry M. Kartchner (Stanford, CA: Stanford University Press, 2014), 144–72. See also Daryl G. Press and Kier A. Lieber, *Coercive Nuclear Campaigns in the 21st Century: Understanding Adversary Incentives and Options for Nuclear Escalation* (Monterey, CA: Naval Postgraduate School, 2013), [www.nps.edu/Academics/Centers/CCC/PASCC/Publications/2013/2013%20001%20Coercive%20Nuclear%20Campaigns.pdf](http://www.nps.edu/Academics/Centers/CCC/PASCC/Publications/2013/2013%20001%20Coercive%20Nuclear%20Campaigns.pdf).
- 80 Escalation dominance can be succinctly defined as a “condition in which a combatant has the ability to escalate a conflict in ways that will be disadvantageous or costly to the adversary while the adversary cannot do the same in return, either because it has no escalation options or because the available options would not improve the adversary’s situation.” Forrest E. Morgan et al., *Dangerous Thresholds: Managing Escalation in the 21st Century* (Santa Monica, CA: RAND Corporation, 2008).
- 81 For a sampling of such fears, which frequently take on shades of full-fledged conspiracy theories, see Nusrat Javeed, “Indians Aiming at Strikes on Pakistani Nukes,” *News–Pakistan*, December 22, 2001, [www.rense.com/general18/indiansaimingatstrikes.htm](http://www.rense.com/general18/indiansaimingatstrikes.htm); Jeffrey Goldberg and Marc Ambinder, “The Pentagon’s Secret Plans to Secure Pakistan’s Nuclear Arsenal,” *National Journal*, November 9, 2011, [http://gsn.nti.org/gsn/nw\\_20111104\\_8533.php](http://gsn.nti.org/gsn/nw_20111104_8533.php); and David E. Sanger, “Obama’s Worst Pakistan Nightmare,” *New York Times*, January 8, 2009.
- 82 Jane Perlez, “Pakistani Army Chief Warns US on Another Raid,” *New York Times*, May 5, 2011, [www.nytimes.com/2011/05/06/world/asia/06react.html](http://www.nytimes.com/2011/05/06/world/asia/06react.html); and Toby Dalton and George Perkovich, “Alliance Is Unstable, Not Pakistan’s Nukes,” *Politico*, May 16, 2011, <http://carnegieendowment.org/2011/05/16/alliance-is-unstable-not-pakistan-s-nukes/2oi>.
- 83 For an in-depth study of the Indian Cold Start doctrine, see Walter C. Ladwig III, “A Cold Start for Hot Wars? The Indian Army’s New Limited War Doctrine,” *International Security* 32, no. 3 (2008): 158–90.
- 84 See Shashank Joshi, “India’s Military Instrument: A Doctrine Stillborn,” *Journal of Strategic Studies* 36, no. 4 (2013): 512–40.

- 85 Comment made by Brigadier Khawar Hanif, Pakistan's former defense attaché to the United States. Quoted by S. Paul Kapur in Sumit Ganguly and S. Paul Kapur, *India, Pakistan and the Bomb, Debating Nuclear Stability in South Asia* (New York: Columbia University Press, 2010), 78.
- 86 See, for example, Jerry Meyerle, et al., *Nuclear Weapons and Coercive Escalation in Regional Conflicts: Lessons From North Korea and Pakistan* (Alexandria, VA: Center for Naval Analyses, 2014), 36; and Michael Krepon, "Pakistan's Nuclear Strategy and Deterrence Stability," in *Deterrence Stability and Escalation Control in South Asia*, ed. Michael Krepon and Julia Thompson (Washington, DC: Stimson Center, 2013), 37.
- 87 Observers have identified two different, yet coexistent, Russian nuclear postures. The first, at the strategic level, is predicated on the threat of massive retaliation and aims to deter nuclear aggression. The second revolves around the threat of limited nuclear strikes—as a means of deterring and terminating high-end conventional war. For a recent analysis of Russia's growing attachment to tactical nuclear weapons and increasingly complex nuclear posture, see Dmitry Adamsky, "Nuclear Incoherence: Deterrence Theory and Non-Strategic Nuclear Weapons in Russia," *Journal of Strategic Studies* 37, no. 1 (2014): 91–134.
- 88 See George Garner, "The Afghan Taliban and Pakistan's Strategic Depth," *Bellum—The Stanford Review*, May 17, 2010, <http://bellum.stanfordreview.org/?p=2184>.
- 89 For an excellent study of the subconventional elements of Pakistan's military strategy, see C. Christine Fair, *Fighting to the End: The Pakistan Army's Way of War* (New York: Oxford University Press, 2014), 226–61.
- 90 Frank O'Donnell and Yogesh Joshi, "India's Missile Defense: Is the Game Worth the Candle?" *Diplomat*, August 2, 2013, <http://thediplomat.com/2013/08/indias-missile-defense-is-the-game-worth-the-candle/?allpages=yes>.
- 91 See Ganguly and Kapur, *India, Pakistan and the Bomb, Debating Nuclear Stability in South Asia*, 84.
- 92 Quoted in Usman Ansari, "Pakistan Seeks to Counter Indian ABM Defenses," March 21, 2011, [www.defensenews.com/story.php?i=6012501](http://www.defensenews.com/story.php?i=6012501). High-speed cruise missiles may succeed in penetrating missile defense systems designed to counter more conventional ballistic missile threats. Low-flying cruise missiles can avoid radar detection and rapidly maneuver in order to dodge intercepting fire. This occurred during the first stages of the second Iraq war, when U.S. and Kuwaiti missile defense systems failed to intercept four out of five incoming Iraqi low-flying cruise missiles. For more, see Dennis M. Gormley, "Missile Defense Myopia: Lessons From the Iraq War," *Survival* 45, no. 4 (2004): 61–86.
- 93 Paul H. Nitze, "Atoms, Strategy and Policy," *Foreign Affairs* 32, no. 2 (1956): 191.
- 94 Andre Beaufre, *An Introduction to Strategy*, trans. P. H. Barry (New York: Praeger, 1965), 130.
- 95 For Francis Gavin, "An understanding of the past doesn't just reveal how things relate over time; history can also expose 'horizontal' connections over space and time. In other words, good historical work can move laterally and reveal linkages between issues that are not readily apparent at first glance. . . . Good horizontal historical work can reveal the complex interconnections and trade-offs that permeate most important foreign policies." See Francis J. Gavin,

- Nuclear Statecraft: History and Strategy in America's Atomic Age* (Ithaca, NY: Cornell University Press, 2012), 14. In some ways, this approximates the approach adopted by Marc Bloch, a famous French historian, to the study of past events, which, “by bringing intelligence to bear on problems of analytic comparison, succeeds in discovering, with ever-increasing accuracy, the parallel movements of cause and effect.” See Marc Bloch, *Strange Defeat: A Statement of Evidence Written in 1940*, trans. Gerard Hopkins (New York: W. W. Norton and Company, 1999), 117–18.
- 96 Quoted by Geoffrey Till, in *Maritime Strategy and the Nuclear Age* (New York: St. Martin's Press, 1984), 183.
- 97 Lt. Commander Joseph J. Bredestage, “Limited Nuclear War at Sea,” *Naval War College Review* 19, no. 6 (1967): 12. See also Donald C. Daniel, “The Soviet Navy and Tactical Nuclear War at Sea,” *Survival* 29, no. 4 (1987): 318–35.
- 98 Desmond Ball, “Nuclear War at Sea,” *International Security* 10, no. 3 (1985): 3–31.
- 99 Linton F. Brooks, “Tactical Nuclear Weapons: The Forgotten Face of Naval Warfare,” *Proceedings* 106, no. 1 (1980): 45. For a succinct description of the effect of nuclear weapons on fleet tactics, see Wayne P. Hughes, *Fleet Tactics and Coastal Combat*, 2nd ed. (Annapolis, MD: Naval Institute Press, 2000), 146–47.
- 100 Soviet Vice Admiral K. A. Stalbo, for instance, observed that the situation has changed to such an extent that a single nuclear-tipped missile or torpedo could, “in some conditions destroy not one major ship, but several such ships and their screening forces.” See Charles C. Petersen, *Soviet Tactics for Warfare at Sea: Two Decades of Upheaval* (Alexandria, VA: Center for Naval Analyses, 1982), [www.cna.org/sites/default/files/research/5500036700.pdf](http://www.cna.org/sites/default/files/research/5500036700.pdf).
- 101 David O. Smith, *The U.S. Experience With Tactical Nuclear Weapons: Lessons for South Asia* (Washington, DC: Stimson Center, 2013), [www.stimson.org/images/uploads/research-pdfs/David\\_Smith\\_Tactical\\_Nuclear\\_Weapons.pdf](http://www.stimson.org/images/uploads/research-pdfs/David_Smith_Tactical_Nuclear_Weapons.pdf).
- 102 The writings of Soviet naval commanders and theorists frequently stressed the importance of “leveling the playing field” by engaging in decisive, preemptive actions at sea. See Vladimir P. Prokofieff, “The Soviet Navy in the Mediterranean and Indian Ocean,” *Virginia Quarterly Review* 49, no. 4 (1973): 491–92.
- 103 Henry A. Kissinger, “Limited War: Conventional or Nuclear? A Reappraisal,” *Daedalus* 89, no. 4 (1960): 800–817.
- 104 Robert Osgood, *Limited War: The Challenge to American Strategy* (Chicago, IL: University of Chicago Press, 1957), 253.
- 105 Bredestage, “Limited Nuclear War at Sea,” 12.
- 106 George Quester, for example, suggested that Soviet writings placed such an emphasis on pre-emption primarily for purposes of domestic signaling and as a means of increasing the Soviet Navy's share of the defense budget. See George H. Quester, “Naval Armaments: The Past as Prologue,” in *Navies and Arms Control*, ed. George H. Quester (New York: Praeger, 1980), 1–11.

- 107 For an interesting summary of this debate, see Karl Lautenschlager, "Theater Nuclear Forces and Grey Area Weapons," *Naval War College Review* 33, no. 5 (1980): 13–22.
- 108 For two of the (many) detailed accounts of this major doctrinal shift, see Freedman, *The Evolution of Nuclear Strategy*, 87–111; and Fred Kaplan, *The Wizards of Armageddon* (Stanford, CA: Stanford University Press, 1983), 185–201.
- 109 Committee on Armed Services, U.S. Senate, *Department of Defense Authorization for FY 1983* (Washington, DC: U.S. Government Printing Office, 1982), 4377.
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- 111 See F. Linton F. Brooks, "Nuclear SLCMs Add to Deterrence and Security," *International Security* 13, no. 3, 169–74.
- 112 Richard W. Fieldhouse, "Nuclear Weapons at Sea," *Bulletin of the Atomic Scientists* 43, no. 7 (1987): 21.
- 113 Lieutenant Paul C. Johnson, "Tomahawk: The Implications of a Strategic/Tactical Mix," *Proceedings* 108, no. 4 (1982): 30.
- 114 Ball, "Nuclear War at Sea," 14.
- 115 Sean M. Lynn-Jones, "A Quiet Success for Arms Control: Preventing Incidents at Sea," *International Security* 9, no. 4 (1985): 168.
- 116 See "The Underwater Cuban Missile Crisis: Soviet Submarines and the Risks of Nuclear War," National Security Archive Electronic Briefing Book 339, October 24, 2012, <http://www2.gwu.edu/~nsarchiv/NSAEBB/NSAEBB399>.
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- 118 For an interesting first-person account of Submarine operations during the Cold War, see John Pina Craven, *The Silent War: The Cold War Battle Beneath the Sea* (New York: Simon and Schuster, 2002).
- 119 Barry R. Posen, *Inadvertent Escalation: Conventional War and Nuclear Risks* (Ithaca, NY: Cornell University Press, 1991).
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- reinforcement and resupply of Europe by sea.” See *National Security Strategy of the United States* (Washington, DC: White House, 1987), [www.bits.de/NRANEU/others/strategy/nss1987.pdf](http://www.bits.de/NRANEU/others/strategy/nss1987.pdf).
- 121 John J. Mearsheimer, “A Strategic Misstep: The Maritime Strategy and Deterrence in Europe,” *International Security* 11, no. 2 (1986): 5.
- 122 See, for example, Bradford Dismukes, *Strategic ASW and the Conventional Defense of Europe* (Alexandria, VA: Center for Naval Analyses, 1987), [www.cna.org/research/1987/strategic-asw-conventional-defense-europe](http://www.cna.org/research/1987/strategic-asw-conventional-defense-europe).
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- 124 See Thomas C. Schelling, *The Strategy of Conflict* (Cambridge, MA: Harvard University Press, 1981), 187–205. Michael Gerson and Kerry Kartchner succinctly describe Schelling’s concept in the following terms: “For Thomas Schelling, the potential for an escalatory process to take hold is something to be taken advantage of. The central idea of the threat that leaves something to chance is that while it would likely be incredible, and probably unwise to threaten large-scale war in response to anything but a major attack, a state can credibly threaten lower-level actions that, if executed, risk starting an uncertain process that could lead to further escalation.” See Kerry M. Kartchner and Michael S. Gerson, “Escalation to Limited War in the 21st Century,” in *On Limited Nuclear War in the 21st Century*, ed. Jeffrey A. Larsen and Kerry M. Kartchner (Stanford, CA: Stanford University Press, 2014), 144–72.
- 125 Brooks, “Nuclear SLCMs Add to Deterrence and Security,” 169–74.
- 126 See James John Tritten, *Declaratory Policy for the Strategic Employment of the Soviet Navy* (Santa Monica, CA: RAND Corporation, 1984), [www.rand.org/pubs/papers/P7005.html](http://www.rand.org/pubs/papers/P7005.html).
- 127 When queried on this issue, Ravi Ganesh responded in the following terms: “My view is that Dhanush must be regarded as a stage in the development of the sea-based deterrent. Sea-based SRBMs—indeed all types of SRBMs—have an adverse impact on crisis stability in the subcontinental context.” Author’s correspondence with retired Vice Admiral Ravi Ganesh, September 2014.
- 128 Ashley J. Tellis, *India’s Emerging Nuclear Posture: Between Recessed Deterrent and Ready Arsenal* (Santa Monica, CA: RAND Corporation, 2001), 573.
- 129 T. S. Subramanian and Y. Mallikarjun, “Prithvi-II, Dhanush Test-Fired Successfully,” *Hindu*, March 11, 2011, <http://m.thehindu.com/news/national/article1528494.ece/?secid=2781>.
- 130 Vipin Narang has rightly observed that the Defense Research & Development Organization’s “press releases and post-test comments unnecessarily—and dangerously—confuse India’s nuclear posture, possibly undermining other organizations’ efforts to implement stabilizing policies.” See Vipin Narang, “Indian Nuclear Posture: Confusing Signals From DRDO,” *IDSAC Comment*, September 26, 2011, [www.idsa.in/idsacomments/IndianNuclearPostureConfusingSignalsfromDRDO\\_vnarang\\_260911.html](http://www.idsa.in/idsacomments/IndianNuclearPostureConfusingSignalsfromDRDO_vnarang_260911.html).

- 131 Writing in 1985, Michael T. Klare made perhaps what remains one of the most compelling cases against the casual employment of dual-use delivery systems, which he described as “trans-firebreak” weapons. “The very advocacy of dual capability,” he argued, “tends to implant the view that conventional and nuclear weapons are essentially *interchangeable*—thus eroding the moral and psychological barrier to escalation.” See Michael T. Klare, “Securing the Firebreak,” *World Policy Journal* 2, no. 2 (1985). For a more modern treatment of the issue, see Barry Watts, *Nuclear-Conventional Firebreaks and the Nuclear Taboo* (Washington, DC: Center for Strategic and Budgetary Assessments, 2013), [www.csbaonline.org/publications/2013/04/nuclear-conventional-firebreaks-and-the-nuclear-taboo](http://www.csbaonline.org/publications/2013/04/nuclear-conventional-firebreaks-and-the-nuclear-taboo).
- 132 James R. Holmes, Andrew C. Winner, and Toshi Yoshihara, *Indian Naval Strategy in the Twenty-First Century* (New York: Routledge, 2009), 125.
- 133 Tellis, *India’s Emerging Nuclear Posture: Between Recessed Deterrent and Ready Arsenal*, 574.
- 134 See Christopher Clary, “The Future of Pakistan’s Nuclear Program,” in *Strategic Asia 2013–2014: Asia in the Second Nuclear Age*, ed. Ashley J. Tellis, Abraham M. Denmark, and Travis Tanner (Seattle: National Bureau of Asian Research, 2013), 140; and Vipin Narang, “Five Myths About India’s Nuclear Posture,” *Washington Quarterly* 36, no. 3 (2013): 151.
- 135 *Freedom to Use the Seas: India’s Maritime Military Strategy*, 113.
- 136 Andrew C. Winner, “Why Indian and Pakistani Sea-Based Nukes Are So Troubling,” *Lowy Interpreter*, August 29, 2014, [www.lowyinterpreter.org/author/Andrew%20Winner.aspx](http://www.lowyinterpreter.org/author/Andrew%20Winner.aspx).
- 137 See Winner, “The Future of India’s Undersea Deterrent,” 169.
- 138 Thomas C. Schelling, *Arms and Influence* (New Haven, CT: Yale University Press, 2008), 101.
- 139 See, “Pakistan Warship Damaged Part of Indian Vessel: Naval Chief,” *Deccan Herald*, June 24, 2011, [www.deccanherald.com/content/171242/pak-warship-damaged-part-indian.html](http://www.deccanherald.com/content/171242/pak-warship-damaged-part-indian.html); Sandeep Unnithan, “Stronger Tides: Pakistan Warship Violates Safety Norms,” *India Today*, June 25, 2011, <http://indiatoday.intoday.in/story/pakistan-warship-violates-safety-norms-damaged-indian-frigate/1/142612.html>. For an excellent explanation of the logic underlying maritime brinkmanship, see Oriana Skylar Mastro, “Signaling and Provocation in Chinese National Security Strategy: A Closer Look at the Impeccable Incident,” *Journal of Strategic Studies* 34, no. 2 (2011): 219–44.
- 140 See Saba Imtiaz, “Fishermen Cross an Imperceptible Line Into Enemy Waters,” *New York Times*, August 24, 2014, [www.nytimes.com/2014/08/25/world/asia/fishermen-cross-an-imperceptible-line-into-enemy-waters.html?\\_r=0](http://www.nytimes.com/2014/08/25/world/asia/fishermen-cross-an-imperceptible-line-into-enemy-waters.html?_r=0). India and Pakistan have yet to resolve their maritime territorial dispute, which centers on the land boundary in Sir Creek (a 40-kilometer-long, or almost 25 mile, area of marshland in the Rann of Kutch, off India’s Gujarat and Pakistan’s Sindh provinces) and its maritime extension.
- 141 For a seminal discussion of the cognitive limitations to the correct interpretations of an adversary’s signaling, see Robert Jervis, Richard Ned Lebow, and Janice Gross Stein, *Psychology and Deterrence: Perspectives on Security* (Baltimore, MD: Johns Hopkins University Press, 1985).

- 142 Sebastien Miraglia, “Deadly or Impotent? Nuclear Command and Control in Pakistan,” *Journal of Strategic Studies* 36, no. 6 (2013): 843. A widely read article made the worrying claim, in 2011, that “instead of moving nuclear material in armored, well-defended convoys, the SPD [Strategic Plans Division] prefers to move material by subterfuge, in civilian-style vehicles without noticeable defenses, in the regular flow of traffic.” See Jeffrey Goldberg and Marc Ambinder, “The Ally From Hell,” *Atlantic*, October 28, 2011, [www.theatlantic.com/magazine/archive/2011/12/the-ally-from-hell/308730](http://www.theatlantic.com/magazine/archive/2011/12/the-ally-from-hell/308730).
- 143 See Salman Siddiqui, “Navy Officers Suspect Inside Job in PNS Mehran,” *Express Tribune*, May 26, 2011, <http://tribune.com.pk/story/176318/navy-officers-suspect-inside-job-in-pns-mehran>; and Zahir Shah Sherazi and Syed Ali Shah, “Navy Officials Arrested in Connection With Dockyard Attack,” *Dawn*, September 12, 2014, [www.dawn.com/news/1131319/navy-officials-arrested-in-connection-with-dockyard-attack](http://www.dawn.com/news/1131319/navy-officials-arrested-in-connection-with-dockyard-attack).
- 144 Pakistan’s decision to expand its network of naval bases remains primarily motivated, however, by a desire to counter the perceived threat of an Indian blockade of Karachi. See Usman Ansari, “New Air Base Continues Pakistan Navy’s Move From Karachi,” *Defense News*, September 4, 2014, [www.defensenews.com/article/20140904/DEFREG03/309040038/New-Air-Base-Continues-Pakistan-Navy-s-Move-From-Karachi](http://www.defensenews.com/article/20140904/DEFREG03/309040038/New-Air-Base-Continues-Pakistan-Navy-s-Move-From-Karachi). Ormara is a town in Balochistan province, located about 360 kilometers, or about 220 miles, west of Karachi.
- 145 Author’s correspondence with Gaurav Kampani, September 2014.
- 146 *Freedom to Use the Seas: India’s Maritime Military Strategy*, 104.
- 147 During the Cold War, U.S. surface ships were grouped into three nuclear survivability levels. Level III (the highest), for aircraft carriers, and large combatants such as destroyers and cruisers, balanced limits for blast, thermal, high-altitude electro-magnetic pulse (HEMP) and transient radiation effects in electronics (TREE). Level II (moderate) for frigates, amphibious assault ships, and certain replenishment ships sought to establish protection for increased standoff ranges for blast, thermal, and HEMP, but not TREE. Level I (the lowest) established very limited nuclear survivability criteria against HEMP for smaller surface combatants such as patrol ships, mine warfare and auxiliary vessels. For more details, see *Report of the Defense Science Board Task Force on Nuclear Weapon Effects Test, Evaluation and Simulation* (Washington DC: Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, 2005), [www.fas.org/irp/agency/dod/dsb/nweffects.pdf](http://www.fas.org/irp/agency/dod/dsb/nweffects.pdf).
- 148 Sir Julian S. Corbett, *Some Principles of Maritime Strategy* (Annapolis, MD: Naval Institute Press, 1988), 132.
- 149 According to the Indian Navy’s Maritime Capability Perspective Plan, the navy envisions a fully network-centric force by 2022. In August 2013, the Indian Navy also launched its first dedicated military communications satellite, the geostationary GSAT-7, or Rukmini, that reportedly has a 2,000-nautical-mile coverage over the Indian Ocean. See “Indian Navy,” *IHS Jane’s World Navies*, July 25, 2014; and Rajat Pandit, “India’s First Military Satellite Will Help Keep Tabs on the Indian Ocean Region,” *Times of India*, August 28, 2013, <http://timesofindia.indiatimes.com/india/Indias-first-military-satellite-will-help-keep-tabs-on-Indian-Ocean-region/articleshow/22125059.cms>.

- 150 See John W. Garver, *The Protracted Contest: Sino-Indian Rivalry in the Twentieth Century* (Seattle: University of Washington Press, 2001), 187–243, Robert J. Macmahon, *The Cold War on the Periphery: The United States, India and Pakistan* (New York: Columbia University Press, 1994); and Adrian Levy and Catherine Scott-Clark, *Deception: Pakistan, the United States, and the Secret Trade in Nuclear Weapons* (New York: Walker Publishing Company, 2007).
- 151 For an excellent overview of the challenges these developments pose to the United States in particular, see Evan Braden Montgomery, “Contested Primacy in the Western Pacific: China’s Rise and the Future of U.S. Power Projection,” *International Security* 38, no. 4 (2014): 115–49.
- 152 See “The Pakistani Nuclear Program,” U.S. State Department Briefing Paper (declassified in response to a Freedom of Information Act Request), June 23, 1983, <http://www2.gwu.edu/~nsarchiv/NSAEBB/NSAEBB6/docs/doc22.pdf>.
- 153 See Dinshaw Mistry, *Containing Missile Proliferation: Strategic Technology, Security Regimes, and International Cooperation in Arms Control* (Seattle: University of Washington Press, 2003), 117–22, T. V. Paul, “Chinese-Pakistani Nuclear/Missile Ties and Balance of Power Politics,” *Nonproliferation Review* 10, no. 2 (2003): 21–29; and Thomas C. Reed and Danny B. Stillman, *The Nuclear Express: A Political History of the Bomb and Its Proliferation* (Minneapolis, MN: Zenith Press, 2009), 236–68.
- 154 See Farhan Bokhari, “Pakistani Senator Urges Progress on Submarine Purchase,” *Jane’s Defence Weekly*, February 25, 2012; and Farhan Bokhari, “China, Pakistan Set for Submarine Deal by End of Year, Say Officials,” *Jane’s Navy International*, February 3, 2014.
- 155 Andrew Erickson, Dennis Gormley, and Jingdong Yuan, in a recent and extensive analysis of China’s growing cruise missile capabilities, noted that there appeared to be an ongoing debate within the People’s Liberation Army Navy over the issue of tactical nuclear delivery. While there appears to be no definitive evidence that China has nuclear-tipped cruise missiles in its inventory, some navy officers have begun to openly advocate acquiring such a capability. See Dennis M. Gormley, Andrew S. Erickson, and Jingdong Yuan, *A Low-Visibility Force Multiplier: Assessing China’s Cruise Missile Ambitions* (Washington, DC: National Defense University, 2014), 75.
- 156 Author’s correspondence with retired Admiral Arun Prakash, September 2014.
- 157 Annual Report to Congress: Military and Security Developments Involving the People’s Republic of China 2014 (Washington, DC: Office of the Secretary of Defense, 2014), 8.
- 158 Chinese strategic writings frequently refer to the so-called first and second island chains, which act as geographical and strategic barriers to China’s naval ambitions. The first island chain stretches from the Kurile Islands, through the main islands of Japan, the Ryukus, the Philippines, and then over to Borneo. The second island chain encompasses a far wider expanse than the first, reaching deep into the Pacific Ocean and skirting the Mariana Islands and Micronesia.
- 159 Avery Goldstein, “First Things First: The Pressing Danger of Crisis Instability in U.S.-China Relations,” *International Security* 37, no. 4 (2013): 22.

- 160 James R. Holmes and Toshi Yoshihara, *Red Star Over the Pacific: China's Rise and the Challenge to U.S. Maritime Strategy* (Annapolis, MD: Naval Institute Press, 2010), 128–30.
- 161 This would be equivalent to that of the U.S. UGM-133 Trident II or of the Russian R-29RMU.
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- 163 Owen. R. Cote Jr., “Assessing the Undersea Balance Between the U.S. and China,” MIT Security Studies Program Working Paper, 2011, [http://web.mit.edu/ssp/publications/working\\_papers/Undersea%20Balance%20WP11-1.pdf](http://web.mit.edu/ssp/publications/working_papers/Undersea%20Balance%20WP11-1.pdf).
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- 165 Koithara, *Managing India's Nuclear Forces*, 121–22.
- 166 Comments made at the event “Challenges to India’s Nuclear Doctrine,” held at the Atlantic Council, Washington, DC, September 4, 2014.
- 167 In February 2014, Lieutenant General Michael Flynn, the director of the U.S. Defense Intelligence Agency, confirmed that China had “recently deployed for the first time a nuclear-powered attack submarine to the Indian Ocean.” See Michael T. Flynn, “Defense Intelligence Agency Annual Threat Assessment: Statement Before the Senate Armed Services Committee,” United States Senate, February 11, 2014, [www.dia.mil/Portals/27/Documents/News/2014\\_DIA\\_SFR\\_SASC\\_ATA\\_FINAL.pdf](http://www.dia.mil/Portals/27/Documents/News/2014_DIA_SFR_SASC_ATA_FINAL.pdf).
- 168 In June 2012, Chinese cyberattacks were reported on India’s Eastern Naval Command. The Indian Navy has since formed its own cybersecurity unit. See Amit R. Saksena, “India Scrambles on Cyber Security,” *Diplomat*, June 18, 2014, <http://thediplomat.com/2014/06/india-scrambles-on-cyber-security>.
- 169 Kosta Tsipis and Randall Forsberg, *Tactical and Strategic Antisubmarine Warfare* (Stockholm: Stockholm International Peace Research Institute, 1974), 27.
- 170 The U.S. Office of Naval Research is currently pursuing a program entitled PLUSNet (the Persistent Littoral Undersea Surveillance Network), with the goal of creating a semiautonomous grid of fixed bottom and mobile sensors, some mounted on UUVs, in order to maintain persistent coverage of certain littoral zones. See Chris Lo, “Persistent Littoral Surveillance: Automated Coast Guards,” *Naval Technology*, May 1, 2012, [www.naval-technology.com/features/featurenavy-persistent-littoral-surveillance-auvs-uuv](http://www.naval-technology.com/features/featurenavy-persistent-littoral-surveillance-auvs-uuv).
- 171 Vice Admiral Michael J. Connor, “Sustaining Undersea Dominance,” *Proceedings* 139, no. 61 (2013): 324.
- 172 This can be referred to as “expeditionary unmanned ASW.” U.S. naval officers have described in detail how such operations could unfold: “Delivery to the operational area will be done by

a large-diameter UUV delivered by a cruise-missile (SSGN) submarine. . . . Once the UUV is in the operational area, it will contact command and verify the intent to continue the mission. On confirmation, the UUV will release the sensor nodes to create a mine line, and it will then update command of its progress and await further instruction. When clearance is given to activate the minefield, the UUV will take position on the bottom and activate miniature torpedoes installed in containers mounted on its sides and belly.” See Joshua J. Edwards and Captain Dennis M. Gallagher, “Mine and Undersea Warfare for the Future,” *Proceedings* 140, no. 81 (2014): 338.

- 173 See Jeffrey Lin and P.W. Singer, “Not a Shark, But a Robot: Chinese University Tests Long-Range Unmanned Mini Sub,” *Popular Science*, June 4, 2014, [www.popsci.com/blog-network/eastern-arsenal/not-shark-robot-chinese-university-tests-long-range-unmanned-mini-sub](http://www.popsci.com/blog-network/eastern-arsenal/not-shark-robot-chinese-university-tests-long-range-unmanned-mini-sub).
- 174 DARPA’s Strategic Technology Office describes the Upward Falling Payloads concept as centering on “developing deployable, unmanned, nonlethal distributed systems that lie on the deep-ocean floor in special containers for years at a time. These deep-sea nodes could be remotely activated when needed and recalled to the surface. In other words they ‘fall upward.’” See DARPA, Strategic Technology Office, “Upward Falling Payloads (UFP),” [www.darpa.mil/Our\\_Work/STO/Programs/Upward\\_Falling\\_Payloads\\_\(UFP\).aspx](http://www.darpa.mil/Our_Work/STO/Programs/Upward_Falling_Payloads_(UFP).aspx).
- 175 India and China are currently developing UUVs for military purposes. Pakistan does not appear to be pursuing a similar effort (at least according to open sources). For a discussion of the Indian Navy’s UUV efforts, see S. Anandan, “India Takes Giant Leap in Autonomous Sea Vehicle Program for Security,” *Hindu*, July 6, 2012, [www.thehindu.com/todays-paper/tp-national/india-takes-giant-leap-in-autonomous-sea-vehicle-programme-for-security/article3607939.ece](http://www.thehindu.com/todays-paper/tp-national/india-takes-giant-leap-in-autonomous-sea-vehicle-programme-for-security/article3607939.ece).
- 176 See James Clay Moltz, *Submarine and Autonomous Vessel Proliferation: Implications for Future Strategic Stability at Sea* (Monterey, CA: Naval Postgraduate School, 2012), 9.
- 177 See Lt. Gen. B. S. Nagal (retd.), “Checks and Balances,” *Force*, June 2014.
- 178 See “Hotline Between Coast Guards of India and Pakistan Working Well,” *Hindu*, January 28, 2008, [www.thehindu.com/todays-paper/tp-national/hotline-between-coast-guards-of-india-and-pakistan-working-well/article1187780.ece](http://www.thehindu.com/todays-paper/tp-national/hotline-between-coast-guards-of-india-and-pakistan-working-well/article1187780.ece).
- 179 Vijay Sakhuja, the director for research at the Indian Council of World Affairs, has described the recent establishment of the Code for Unplanned Encounters at Sea, at the fourteenth Western Pacific Naval Symposium, as something that “Indian ocean navies could learn from.” See Vijay Sakhuja, “Indian Ocean Navies: Lessons From the Pacific,” Institute for Peace and Conflict Studies, June 2014, [www.ipcs.org/article/navy/indian-ocean-navies-lessons-from-the-pacific-4485.html](http://www.ipcs.org/article/navy/indian-ocean-navies-lessons-from-the-pacific-4485.html).
- 180 Lt. Commander Muhammad Ali, *Maritime Issues Between Pakistan and India: Seeking Cooperation and Regional Stability* (Monterey, CA: Naval Postgraduate School, 2012), [www.dtic.mil/dtic/tr/fulltext/u2/a573577.pdf](http://www.dtic.mil/dtic/tr/fulltext/u2/a573577.pdf).



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