CHAPTER 10

NUCLEAR MISSILE-RELATED RISKS IN SOUTH ASIA

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INTRODUCTION

In April 2000, a few days before embarking on the first visit in 22 years by an American President to India and Pakistan, President Bill Clinton referred to South Asia as "the most dangerous place in the world." More than 10 years down the line, many would still consider that description apt. South Asia is the only region in the world where there are serious disputes involving the risk of war between three contiguous nuclear-armed countries with a history of military conflict.[1]

The history of India's relations with China and Pakistan is characterized by conflicts and animosity. This chapter will lay out the historical background that has brought the three countries to their respective current strategic perspectives. The differing world views of the three countries have molded their individual strategic postures, and each has come to adopt nuclear weapons as a security imperative for differing reasons. Based on their strategic perceptions, the nature and quantum of their nuclear arsenals, too, are widely disparate. China views its main threat as the United States, against which its nuclear deterrent is designed. India views its major strategic threat as emanating from China, though its immediate concern is Pakistan's support of cross-border terrorism and the Pakistan military's periodic attempts to change the agreed lines of control on its borders. Pakistan views

India as its major threat, whose aim is to destroy the Pakistan state. The nuclear equation between China, India, and Pakistan is often characterized by the analogy of a triangle; it would be more apt to compare it to a vicious circle, in which an action by one results in an escalatory reaction from the other two.

The chapter will then take a brief overview of the nuclear forces of the three countries, highlight the main features of each, and examine the linkage between force architectures and the respective strategic postures. The missile defense policies of each country will be discussed, and their current and potential capabilities assessed.

In the unbalanced nuclear situation that exists among the three countries, there is a risk of missile competitions acquiring their own dynamic. The chapter looks at current and possible future missile rivalries, and the possibility and effects of some kind of offensive missile restraint regime as in the Intermediate-Range Nuclear Forces (INF) Treaty. The recent implosion of the Union of Soviet Socialist Republics (USSR) under the burden of its calamitous arms race with the United States carries too grave a lesson for any of these countries to ignore. The chapter suggests that both India and China have similar approaches in that they do not believe that parity of nuclear forces is a prerequisite for deterrence. Discussing the risk factors in the India-Pakistan context, the chapter concludes that the main threat of unintended or uncontrolled nuclear conflict is from short-range ballistic missiles (SRBMs), and this is possibly due to escalation triggered by their employment as a battlefield weapon. The chapter also argues that ambiguity in nuclear doctrine carries the danger of wrong interpretation of intentions and is a risk-prone strategy.

The chapter concludes with some suggestions for risk reduction, including the possibility of moves toward recessing the deterrent and elimination of SRBMs.

HISTORICAL BACKGROUND

India and Pakistan.

The sustained hostility between India and Pakistan has existed since the two countries became independent, and the reasons are deep-rooted. In the princely state of Jammu and Kashmir, whereas the Jammu District had a preponderance of Hindus, Kashmir had a Muslim majority. When India and Pakistan became independent, the erstwhile Indian princedoms were given the choice of accession, and the Hindu ruler of Jammu and Kashmir opted to join India. For Pakistan, which was founded on the basis of religious identity, this was a negation of the basis of its creation. In 1948, Pakistan sent in its troops along with tribal militants to seize Kashmir, and India sent in its army. Both countries heeded a ceasefire call by the United Nations (UN), but each held on to the territory it had under its control. That situation continues to this day.

As the years passed, the differences between the two countries widened. India is a secular democracy; Pakistan has been ruled by military dictators for about 30 of its 63 years of statehood. In the general elections held in Pakistan in 1970, West Pakistan rulers were stunned when Shaikh Mujib-ur-Rehman, the Bengali leader of East Pakistan, won an overwhelming majority and claimed the Prime Ministership. General Yahya Khan, the Chief Martial Law Administrator, refused to accept the election result, and Mujib was

put in prison.[2] Following Mujib's imprisonment and transfer to a prison in West Pakistan, a group of rebel officers declared Bangladesh independent on March 26, 1971. In response, the Pakistani Army launched bloody reprisals (Operation SEARCHLIGHT), killing almost a million Bengalis. Over 10-million refugees fled across the border for sanctuary in Indian refugee camps.[3] When the December 1971 war broke out between India and Pakistan and with India's victory, East Pakistan became Bangladesh.

These seminal events—the accession of Kashmir to India, Pakistan's loss of its eastern territory, and the overwhelming defeat in the war (which ended with 90,000 Pakistani troops in Indian prisoner-of-war camps)—have deeply affected the national psyche, which now blames India for all the nation's problems. Pakistan still thirsts for revenge.

Immediately after the war ended, Zulfikar Ali Bhutto, who had replaced Yahya Khan as the President of Pakistan, launched his program to acquire a nuclear bomb, which he termed the "Islamic bomb." India demonstrated its nuclear capability by exploding a subterranean nuclear device in 1974, and, with China's assistance, Pakistan accelerated the progress of its nuclear quest. In 1998, India exploded several nuclear devices and declared itself a weapons state. Days later, Pakistan followed suit.

India and China.

India inherited its troubled relations with China from its former British rulers. Ironically, independent India had been among the first countries to recognize the new government of China in 1949, when the rest of the world still recognized Chiang Kai-Shek's Formo-

sa as the real China. But the very next year, Chinese troops occupied Tibet, and India extended shelter to the Dalai Lama, who formed a government-in-exile in the Indian state of Himachal. Thousands of Tibetan refugees crossed over into India and live there to this day. The core issues between the two countries are the status of Tibet, Chinese territorial claims on the northern and eastern borders of India, and India's sympathy toward and protection of the Dalai Lama. The territorial claims by China vary in force from time to time; indeed, China uses the border issue to regulate the temperature of its relations with India, depending on its interests in the issues current at any given time.

While the Indian Government does not allow the Dalai Lama to engage in political activity and has accepted Tibet as an autonomous region under China, there is still great Chinese mistrust of India's position on this issue. The prickly relations between the two are exacerbated by China's support to Pakistan and its covert transfer of nuclear technology and nuclear materials, as well as conventional weapons, to that country. In an act that impacted Indian security, Pakistan ceded part of the disputed territory under its control north of Kashmir to China, which gave China direct access from Sinkiang to Tibet.

While the main causes of poor relations between China and India can be identified and resolved, given political will on both sides, there are some less tangible reasons. China is on the rise; its long-nurtured global ambitions are now beginning to reach a stage that it can brook no impediments, and it views India as a challenge to its aspirations to be the foremost power in Asia.

Pakistan and China.

Pakistan has built up close relations with China across the spectrum of military, economic, and political cooperation. It was among the earlier countries to accord recognition to the communist government in 1950, but later opposed the entry of China into the UN out of deference to the United States. For many years, Pakistan's attitude to China mirrored that of the United States, with which it was allied in the Central Treaty Organization.

The U.S. military assistance to India after the Chinese attack in 1962 and the U.S. refusal to intervene militarily on Pakistan's side in the wars against India in 1965 and 1971 were probably influential in bringing Pakistan much closer to China. China began to support Pakistan against India on Kashmir. China has made huge investments in Pakistan, particularly in Gwadar and northern Baluchistan, to the extent of nearly $20 billion.[4] The United States has applied sanctions on Pakistan sporadically; the on-again off-again pattern of economic and military aid has been determined by its perceived need for Pakistan's assistance in the Afghanistan imbroglio.

Most importantly, from the 1980s to the 1990s, China supplied Pakistan with nuclear technology and missiles, as well as equipment and facilities for uranium enrichment. Currently, two more reactors are being built with Chinese assistance to produce weapon-grade plutonium. With its growing international footprint, China is today able to defy the United States and is in the process of continuing and expanding its nuclear cooperation with Pakistan.

For its part, Pakistan has provided China with access to the Indian Ocean, has made territorial "adjust-

ments" to enable China to build a highway connecting Sinkiang to Tibet and to Pakistan, and has supported China on all international disputes. Each country uses the other for its own reasons involving India. China uses Pakistan as a cat's paw to slow India's growth and development, complicate its security environment, and act as a strategic distraction. Pakistan uses China to get political support, military hardware, and nuclear weapons and technology.

STRATEGIC PERCEPTIONS

China.

China sees itself as surrounded on all sides by unfriendly states aligned to prevent its rise to a position of eminence, and, in response, has acted vigorously to provide its armed forces with adequate retaliatory and offensive capability. It considers the United States its major adversary, which has declared its intention to prevent the re-absorption of Taiwan. China also views Japan and South Korea as willing allies of the United States in any conflict situation, and is particularly concerned about the American plans for missile defense cooperation with these countries.

China's relations with Russia have been uneasy in the past, but there has been a quantum increase in their mutual cooperation since the collapse of the USSR and America's emergence as the sole superpower. However, underlying the good relations is still an element of suspicion that makes the two countries wary of each other.

China's relations with India swing from cold to overtly hostile, with sporadic thaws. While full-scale military action is an unlikely option, China skilfully

manipulates the long-standing claim on India's north-eastern and western borders issue to extract diplomatic mileage, and even engages in minor border incidents to keep the "pot boiling." India's growth and progress have created a southern flank situation for China, which it has factored into its defense posture by the militarization of Tibet and by establishing missile bases within striking range of Indian targets.[5]

The U.S. threat, however, is the main driver of its security strategy and the predominant factor in China's strategic calculus, which subsumes all other threat considerations.

Pakistan.

Pakistan's threat perception and defense posture are entirely Indo-centric. The country began its military nuclear program as a sequel to the defeat in the 1971 war with India. By 1979, Pakistan had already set up its facilities for producing weapons-grade uranium, when it incurred U.S. punitive action. In the 1990s, plutonium production was operationalized with the commissioning of the Chinese-designed and supplied Khushab reactor,[6] and China still continues to play a major role in Pakistan's nuclear program.

When the United States launched its War on Terror, Pakistan had little choice but to fall in line and support the U.S. campaign in Afghanistan against al Qaeda and the Taliban. With its own military heavily under attack by the Taliban, the Pakistani Government is hard pressed to balance the conflicting demands of its Army, the Islamic fundamentalists, and the Baluchistan secessionists on the one hand, and America's operational dictates on the other. There is a great deal of sympathy for the Islamist cause among sections of the

military and the population, and resentment against the government for acting against the Taliban at the behest of the Americans. China is viewed as a staunch and permanent ally, whose friendship with Pakistan is "as high as the mountains and as deep as the ocean."[7]

India.

India perceives a military threat on two fronts. The threat from Pakistan has persisted since both countries became independent in 1947. While the central issue according to Pakistan is the dispute over Kashmir, India's view is that this may have been true until some years ago, but the situation now has gone beyond Kashmir to one of Pakistan's support and exploitation of nonstate militancy, which uses terrorist-type tactics. India has been attacked by Pakistan-based terrorists seven or eight times in the last 8 years; on every occasion, it has been persuaded and pressured by the international community led by the United States to exercise restraint.

China blows hot and cold on the border issue, using it as a regulator to manipulate Indian and regional attitudes. Having fought wars with both countries, India views their close relations and China's supplies of nuclear technology and weapons to Pakistan with concern. In recent times, China's rising prosperity has resulted in a new expansionist approach, both in foreign economic policies (trade and acquisition of oil and other commodities), as well as in its strategic expansion into the Indian Ocean region. These factors impelled the Indian Defence Minister, George Fernandes, to state publicly that China was India's major threat.[8] India's major strategic concern is China, but its short-term security preoccupations are completely dominated by Pakistan-related issues.

LINKAGES BETWEEN STRATEGIC PERCEPTIONS AND STRATEGIC FORCE STRUCTURES

In classical national security planning, nations define their national objectives and their vital national interests. Based on these, nations develop a grand strategy to safeguard those interests. From there flow the security architecture and force levels, depending on the technological and economic strength of the country. It is also a historical phenomenon that as the resources and capabilities grow, the expanding military potential fuels higher national ambitions, and national interests and strategy are modified to meet the changed aspirations.

China.

Although China is being discussed along with the other two South Asian powers because of the geopolitical framework of this book, this chapter does not view it solely within this narrow power grouping. China is an aspiring superpower, and in many ways already has a power status that is second only to that of the United States. As has been amply emphasized, China's main threat is the United States, and its immediate security concern is to prevent international (read: American) legitimization of an independent status for Taiwan. While China will not act precipitately to bring about Taiwan's reunification, it views that as an inevitability, and has worked steadfastly toward that goal. In 1999, China had about 150 deployable SRBMs in the Taiwan theater, which grew to about 650 in 2005; the number is currently over a

thousand. Similarly, the number and the capability of China's intermediate-range ballistic missiles (IRBMs) have increased, and the current accuracies of these longer-range missiles are aimed at restricting U.S. logistic and support capabilities in Japan and the Pacific. China's DF 21D has already generated more articles, especially in U.S. naval circles, than any other single weapon in recent times, because of its purported ability to target U.S. carrier battle groups in the Asian Pacific. China's growing intercontinental ballistic missile (ICBM) arsenal, too, makes the retaliatory capability against mainland United States increasingly credible. China is acting logically and consistently to attain its strategic aims of preventing the *de jure* independence of Taiwan, and building its might, slowly, to be able to challenge the United States.

India.

India has often been accused of lacking in strategic vision, and as, many Indians believe, not entirely without reason. Although there has been a recent increase in the general discourse in matters concerning security and strategy, the amount of attention that the Indian polity devotes to these vital aspects needs to be far greater than it is. India has identified its threats in general terms as emanating from the possession of nuclear weapons by both its neighbors and their active mutual collusion. It has, accordingly, embarked on a program to be able to retaliate against an attack by China, though the progress is rather slow. To meet its perceived threats, India needs not large numbers, but adequate missiles with the capability to cause unacceptable damage at a range of between 4,000 and 5,000 kilometers (km). This perception has led naturally to

the development of SRBMs, medium-range ballistic missiles (MRBMs), and, as recently announced, the 5,000-km range Agni. Most of India's operational missiles are of short range, which might lead one to the conclusion that its main preoccupation is with Pakistan. However, this must be looked at as being more due to the developmental process than an indicator of India's strategic priorities. India's progress can be flagged by the steady increase in the ranges of its missiles, and the preponderance of SRBMs is only partially due to its perceived requirements. This proportion is likely to change as the longer-range missiles are improved, and their serial production gathers momentum. A major reason for India's missile inventory not yet reflecting its strategic imperatives is the narrow design and engineering base for military armament production. This is restricted to just one government organization, which is responsible for the design and the development of short-, medium-, intermediate- and long-range missiles, cruise missiles, submarine-launched ballistic missiles (SLBMs), and missile defence. The planned Indian missile force architecture is rational and in line with strategic needs, but it is a few years behind the stage where it could have been, because of inadequate human and material resource utilization; the private sector has still to be brought meaningfully into the design and production chain.

Pakistan.

Pakistan's force planning is facilitated by its relatively uncomplicated strategic threat evaluation. Pakistan's single-point focus and the ease with which it has circumvented international laws to acquire its missile force have enabled it to meet its basic strategic requirements in a very short time, and Pakistan's ac-

quisition of longer-range missiles has expanded and improved its capability.

In contrast to India, Pakistan's missile force is well-matched with its needs. Pakistan has missiles of the ranges required, and its medium-range missiles are ready to be operationalized. The development of the country's short- and medium-range missiles has progressed almost in parallel, giving the overall system structure a balanced look. Simultaneously, Pakistan is developing (acquiring) land attack cruise missiles of both the ground- and air-launched variety, and a sea-based version is reportedly planned. A major factor is that Pakistan's missiles were supplied wholesale by China and Korea, and even the production factories were built by them. Also, Pakistan seems to have had no economic problems, since these supplies come under special financial arrangements with China—not to mention the generous aid given by the United States for its War on Terror and the clandestine financial support from several Arab states. Pakistan's missile forces closely match its strategic needs, and it is currently engaged in expanding its cruise missile capability.

NUCLEAR AND MISSILE FORCES

China.

China's military strategy underwent a significant change after the 1991 Gulf War. The lessons that the Chinese People's Liberation Army (PLA) drew were profound:

- The pace of modern war demands long-range offensive capability.
- Missile defense is crucial to the outcome of the war.

- Air power is central to the success of land- and sea-based operations.
- Information technology is no longer an adjunct, but the most vital component of the military's operational and technical resources.

The PLA's modernization drive was a direct outcome of the analysis of the Gulf War. At the center of the modernization was the development of long-range missiles as well as missile defense, air power, and information technology.[9]

Mark Stokes and Ian Easton, in their "Evolving Aerospace Trends in the Asia-Pacific Region," emphasize that it is the organization and structure of the force, rather than just numbers, that give it its relevance. Unlike in any other country, the centerpiece of China's deterrent is a force of nuclear-armed missiles with a core of conventional ballistic missiles under the integrated command of the Second Artillery. The authors sum up the thrust of China's aerospace strategy thus:

> Increasingly accurate conventional ballistic missiles and ground launched cruise missiles (GLCMs) are the optimal means for suppressing enemy air defense and creating a more permissive environment for subsequent conventional air operations due to their relative immunity to defense systems. In a conflict, they can be supported by electronic attack assets which reduce early warning and confuse enemy commanders. In addition, space-based, airborne, and ground-based sensors can facilitate command and control, and provide crucial strategic intelligence, theater awareness, targeting, and battle damage assessment information.[10]

China's all-round force modernization is far more ambitious than is realized by many in all respects—in numbers, in variety, in quality, and in strategic innovativeness. To cite Stokes and Easton again, the Chinese approach to the Taiwan issue is an example of what other countries with which China has had historical territorial disputes might expect. In the case of Taiwan, China has adopted a posture of continuous and low-level coercion—having established aerospace superiority and displaying the capability to blockade and invade over water. To deal with the expected U.S. sea-based intervention, China has publicised the capability of its DF 21-D missile with a payload of over 500 kg and a range of over 2,000 km, with a circular error probable (CEP) of just 50 meters.[11]

Main Features of China's Missile Inventory.

Details of China's missile force are given in Appendix 10-1, Tables 1 and 2. The important features are:

a. Of a total estimated number of about 1,300 missiles, about 1,150 are SRBMs, for which there are about 150 nuclear warheads; the rest of the SRBMs are conventionally armed. Almost all the SRBMs are ranged on the coast to meet a Taiwan contingency.

b. The remaining inventory consists of about 90 MRBMs, 20 IRBMs, and 40 ICBMs, with about 100 plus nuclear warheads between them. It is assumed that all IRBMs and ICBMs would be nuclear-armed.

c. China has built and acquired a large number of cruise missiles, including land attack cruise missiles (LACMs) and anti-ship cruise missiles (ASCMs) to cater for a confrontation with the United States over Taiwan. Some of the cruise missiles are long-range (2,000 to 3,000 km) and are nuclear capable.

d. To maintain military as well as political pressure on Taiwan, China has deployed heavy concentrations of short- and medium-range missiles in the coastal region adjacent to the Taiwan Straits.

e. Missile bases in northeastern, western, and southern China (Appendix 10-4) are equipped with MRBMs, IRBMs and LACMs that can target Japan and South Korea, Russia, and India respectively.

f. China has instituted a comprehensive modernization of its missile forces, and wherever newer versions have or are being developed, it may be presumed that progressive replacement of the older version is being undertaken.

g. China still does not have an operational sea-based deterrent. The JL 2 SLBM is under development and will have to wait for the Jin class nuclear-powered ballistic missile submarines (SSBN) to complete sea trials before it can itself undergo submerged launch tests.

Pakistan.

Pakistan began its nuclear program soon after the disastrous Bangladesh war of 1971, and it has created a missile force that will reach practically the whole of India when operationalized. In the early stages, American-supplied F-16s were the primary delivery vehicles. Later, Pakistan changed over to missiles as the main delivery system, when the United States applied sanctions under the Pressler Amendment. With Pakistan now an ally of the United States in the War against Terror, F-16s are again being supplied (16 aircraft up to 2008), and the older aircraft have been taken up for refurbishing in the United States. However, ballistic and cruise missiles remain the preferred

choice as nuclear weapon delivery vehicles, since they have definite advantages, not the least of which is India's lack of an operational missile defense capability.

Pakistan's acquisition of missiles began in the mid-to-late 1980s. It has been supplied a range of solid-fueled SRBMs by China. North Korea, too, has provided Pakistan with liquid-fueled missiles, reportedly in exchange for uranium enrichment technology. During the mid-1990s, a complete missile manufacturing plant was transferred to Pakistan by China, and:

> Chinese assistance most likely encompassed equipment and technology transfers in the areas of solid-fuel propellants, manufacture of airframes, re-entry thermal protection materials, post-boost vehicles, guidance and control, missile computers, integration of warheads, and the manufacture of transporter-erector launchers (TELs) for the missiles.[12]

China's assistance continued and even accelerated after the 1998 nuclear tests. It now nominally observes the Missile Technology Control Regime (MTCR) guidelines, but makes important exceptions, such as excluding cruise missiles and not counting the supply of weapons in a dismantled state that enable China to continue business as usual with Pakistan.

Main Features of Pakistan's Missile Inventory.

Details of Pakistan's missile force are in Appendix 10-2, Tables 3 and 4. Its main features are:

a. The missile inventory is estimated to consist of about 85 Hatf 3 (Ghaznavi) SRBMs of 280-km range, about 40 Hatf 4 missiles of about 800-km range, and about 10 to 15 Hatf 5 (NODONG) MRBMs with a 1000-km range.

b. The Babur is a ground-launched LACM, probably the Chinese DF 10, which itself is a derivative of the U.S. Tomahawk.[13]

c. An air-launched cruise missile, the Hatf 8, has been test-launched from a *Mirage* aircraft. The Hatf 8 ("Ra'ad") reportedly has a range of about 350 km. The air-launched version of the Babur is also being planned to be developed.

d. While as far as is known Pakistan does not have plans for a sea-based ballistic missile deterrent, it plans to develop a submarine-launched version of the Babur missile subsequently, to give it a sea-based deterrent in the form of an SLCM.

e. Pakistan's missiles are all of Chinese or Korean origin and design, and the country still depends heavily on China and the Democratic People's Republic of Korea (DPRK) for missile technology and hardware.

f. The Ghaznavi (M11) and Shaheen (probably M9), both SRBMs, are believed to be operational.

g. The Shaheen II (MRBM) development is complete, and induction and service trials may soon commence. Ghauri II (MRBM) development may be completed soon. Ghauri III (IRBM) is still estimated to be about 5 years further away.

The current Pakistan inventory, when fully operational, will have ground-, air- and submarine-launched components (the latter two being purely cruise missile equipped) with sufficient reach to strike any point in India.

India.

After the Chinese border attack in 1962 and the nuclear test by China in 1964, India began work on nuclear explosive devices. This culminated in its "peaceful

nuclear explosion" in 1974. After this bold step, India relapsed into inactivity for no known reason. About India's confused and indecisive approach to nuclear matters, the late Indian Army Chief, General Sundarji, sardonically wrote: "Between the mid-seventies and the mid-eighties India's decision-making in this regard appears to have enjoyed something halfway between a drugged sleep and a deep post-prandial slumber."[14] In the 1980s, Indian intelligence finally became aware of Pakistan's efforts to acquire nuclear weapons from China. After oblique threats by Pakistan during the Brasstacks crisis in 1982, the Indian government seemed to have been shaken into wakefulness and reviewed its options for weaponization. In 1983, Dr. Abdul Kalam, the head of the Defence Research and Development Organisation (DRDO), was tasked to develop two types of strategic ballistic missiles and three types of battlefield tactical missiles (an anti-tank missile and two anti-aircraft missiles—one short-range and one medium-range).

The program, called the Integrated Guided Missile Development Program, made progress in the next decade, and produced the 150-km SRBM Prithvi ("Earth") and the 1,500-km range IRBM Agni ("Fire"). The latter was particularly important, since it proved India's "re-entry vehicle" technology and formed the basis for longer-range Agnis of 2,000 and 3,000 km, as well as the 5,000-km range Agni that is to be developed. A supersonic cruise missile, BrahMos, has been produced by Russia and India in a joint venture. The missile, with a range of 750 km, will have all three variants (ground/air/sea launched) and is expected to enter operational service with the Army and Air Force in the near future. The naval version is still to be developed. In the last 10 years, India has made visible progress in ship- and submarine-launched missiles,

and currently a 1,000-km cruise missile (Nirbhay) is also under development.[15]

Main Features of India's Missile Inventory.

Details of India's missile force are in Appendix 10-3, Tables 5 and 6. The main features are:

a. Over time, India has achieved a certain degree of invulnerability to technology denial.

b. The latest test of the Agni III, specifically to test its range capability of 3,500 km, was successfully carried out on February 8, 2010. The missile is soon to be delivered to the Army.

c. Russia is collaborating with India for the production of the supersonic cruise missile BrahMos.

d. There are reports that the DRDO has completed development of the Agni IV IRBM and is going ahead directly with the Agni V, with a range of over 5000 km.[16]

e. The development of a cruise missile, Nirbhay, with a range of 1,000 km is also reported to be in progress.

SOUTH ASIA AND MISSILE DEFENSE

The strategic implications of missile defense in relation to the stability of nuclear deterrence were a major issue of contention between the two superpowers during the Cold War, until the signing of the Anti-Ballistic Missile (ABM) Treaty in 1972. The United States withdrew unilaterally from the Treaty in 2001, causing great unease and criticism in Russia and China.

The main argument put forward in favor of missile defense is that if all countries have effective missile defense, the value of offensive nuclear weapons would be greatly diminished and would pave the way

for disarmament. Another argument made was that deterrence does not work with states with irrational leaders, and their potential adversaries cannot remain defenseless.

The opponents of missile defense point out that the immediate reaction will be for the nuclear-armed countries without anti-missile defense (AMD) capability to increase their stockpiles in an effort to restore nuclear parity. Not only will the number of missiles in the total global arsenal increase, but tactics will now veer toward saturation attacks, which will present a far greater threat.[17] Russia and China strongly oppose missile defense, since they consider it a means for the United States to gain and maintain nuclear superiority, which is antithetical to nuclear stability.

There is apparent logic in the arguments of both sides, and even in the United States, the support for missile defense as a strategy is far from universal. The United States has taken the crucial step and changed its nuclear strategy to include nuclear defense as one leg of the new "strategic triad." While announcing its plans for implementation of the new strategy, the United States also simultaneously announced a unilateral reduction in its missile strength, thus dampening the validity of the argument about arms escalation.

The risk as far as South Asia is concerned is that China has already started increasing its number of deployable warheads by making its missiles multiple independently targetable, re-entry vehicle (MIRV)-capable. There is apprehension that this can cause arsenal escalation by India, and then, in response to India's, by Pakistan.[18]

The conclusion that can be drawn is not surprising: missile defense adds to the effectiveness of a country's nuclear deterrence; it is supported by states that possess or have access to the requisite technology and

resources, and opposed by states that have lesser capability in these aspects. But one thing is fairly unarguable—missile defense is not a purely defensive capability, since it enhances the possessor's aggressive potential as well.

MISSILE DEFENSE POLICIES AND CAPABILITIES

China.

When the United States decided to withdraw from the ABM Treaty and embark on developing a national missile defense system, China was critical of the step for the same reasons as Russia was. But the level of protest rose sharply when the *Nuclear Posture Review* of the George W. Bush administration formally included nuclear defense in U.S. strategy as one leg of the new strategic triad. China denounced this as a retrograde measure, which would increase the risk of nuclear war. There were vague rumblings that China's cooperation with the United States on issues such as the Nonproliferation Treaty (NPT), MTCR, and Fissile Material Cutoff Treaty (FMCT) would be reviewed. China's apprehension would obviously be that its small arsenal could be neutralized, leaving it completely defenseless against the United States.[19]

AMD Capability.

In comparison with India, China has a head start in missile defense technology. According to an article in the website, *SinoDefence.com*, as early as in 1963, Mao had ordered the creation of a strategic force capable of both offense and defense.[20] A directive was issued to

commence "Project 640," as it was called in 1964, and infrastructure was built in about 5 years for the design and development of anti-ballistic missiles. Considerable work was done on mono-pulse and phased array radars, and a network of early warning ground radar stations was established. The signing of the ABM Treaty by the United States and the USSR diluted the urgency of this project, which was finally cancelled in 1980 by Deng Hsiao Ping. The radar network was converted to serve the growing space program.

China later re-energized its missile defense program, probably when the United States unilaterally withdrew from the ABM Treaty in 2001. In 2004, China purchased 120 S-300P interceptor missile systems (North Atlantic Treaty Organization [NATO] designation SA-10) from Russia and soon produced its own versions—the HQ10 and HQ15 systems—as well as the HQ9 system, which is thought to have borrowed Patriot technology.

On January 12, 2011, China carried out a successful high-altitude interception of a ground-launched missile within its own territory. Analysts differ on the type of missile that was fired, but it was probably an HQ9 missile (based on the DF21 series) with kinetic kill capability. All indications, therefore, are that China is pursuing the creation of an offensive-defensive strategic capability vigorously and has capabilities across the spectrum to attack missiles in the cruise phase to the terminal defense. China historically has depended on the USSR (and now Russia) for periodic injections of new technology, which it then internalizes and is able to develop and mass-produce the end product on the acquired technology base. To accelerate the creation of its AMD base, which now appears to have become an urgent aim, China may well resort to more

assistance from Russia for technological upgrades rather than depend entirely on its own research and development. China appears to have responded to the U.S. AMD strategy with a surge in the national effort to build a modern missile defense capability, rather than just resort to increasing its missile arsenal.

Pakistan.

Predictably, Pakistan has followed China's cue and opposes AMD. There are good reasons for this response. First, regardless of its being on the American side in the War on Terror, Pakistan is China's strategic ally, and it is inconceivable that it would take a contrary position on such a major issue. Second—and this would be an overriding consideration—Pakistan considers its nuclear arsenal the equalizer in its military balance against India, and it is only to be expected that it would seek to oppose any move to change the nuclear relativities.

AMD Capability.

Pakistan has made no moves toward developing a missile defense system. It already depends heavily on financial support that the United States provides for the War against Terror, and the economic burden of research, development, acquisition, and maintenance of an AMD system is not an option in its current state. Pakistan would have to depend on China for the acquisition of one, which China itself is in the early stages of developing. Pakistan is much more likely to wait for China to transfer the systems to it in the fullness of time. In the meanwhile, it continues to condemn missile defense development efforts by India.

India.

After some initial reservations, India supported the U.S. AMD strategy when the United States announced its proposed Theater Missile Defense (TMD) plans simultaneously with significant missile cuts. In the Indian perception, the U.S. AMD policy represented a shift of emphasis to defensive deterrence, which is more in tune with India's political preferences. From India's point of view, the TMD strategy not only made it possible to avoid, or at least reduce, the enormous expense involved in building a large arsenal of IRBMs and ICBMs; the strategy also jelled with the two major precepts of India's own promulgated nuclear doctrine: no first use and a credible minimum deterrent. India's stance on the AMD policy was not without its benefits. The Bush administration cleared the Israeli Green Pine radar system for sale to India, and also entered into talks with India on cooperation in missile defense. An agreement entitled a "New Framework for the U.S.-India Defense Relationship" was signed by Secretary of Defense Donald Rumsfeld and the India Defence Minister Pranob Mukherjee on June 28, 2005, which specifically mentions a commitment to collaborate in missile defense.[21] Though the agreement was signed 5 years ago, there is thus far no tangible evidence of any collaboration in this field—a fact that may be due to Pakistan's objections to the United States. There are several published reports about India's efforts to develop an anti-missile missile, and from current indications, it is clear that India has decided to build its own missile defense capability. How extensive the coverage will be is an open question.

AMD Capability.

While India has had plans to develop a missile defense system for some time, progress has only been seen in the last few years. The first test was an exo-atmospheric interception at an altitude of 48 km in November 2006, followed by an endo-atmospheric launch in December 2008 at an altitude of 15 km. In March 2009, a third successful interception was carried out, reportedly at a much greater altitude than the March 2006 test.[22] A fourth test launch conducted in March 2011 failed, because of one of the missiles veering from its course. According to news reports, the test will be conducted again in June.[23]

The early warning and tracking radars that comprise other vital parts of the missile defense system were acquired from Israel. Three "Green Pine" systems have been purchased, and the missile that complements them is still under development. The Arrow 2 missile, which was part of the original system, was not cleared by the United States, since it falls in Category I of the MTCR. A compatible missile will have to be acquired or developed from within existing Indian designs. India has the developmental capability, but in the available time frame, it is likely that, while continuing with its developmental efforts, it will seek assistance in specific technology areas. India has thus embarked on a comprehensive missile defense program to cover all stages of an incoming missile's trajectory, but it will probably be some years before India can field an operational missile defense system.

EXISTING AND POTENTIAL MISSILE COMPETITIONS

The missile competitions and rivalries among India, China, and Pakistan are complex: each country's missile force architecture is based on its own threat perception and world view. China has global aspirations, and the United States is its main rival and potential adversary. If China builds a capability sufficient for its objectives against the United States, then that capability will also be sufficient for it to deal with its lesser threats. China does not compete with India directly; it does this obliquely, by regulating the flow of strategic arms and material to Pakistan.

India's ambitions are less grandiose, and limited to maintaining an adequate defense capability against its hostile northern and western neighbors. The threat posed by China is the main driver that determines India's missile force architecture. An area of doubt is the quantitative interpretation of India's aim of a credible minimum deterrent.

Pakistan's view is focused on India's capability; it aspires to buildup its missile force to equal India's. As India seeks to balance its capability with China, Pakistan perceives an imbalance in relation to India and acts to rectify it. China and Pakistan are allied against India for strategic, if not military, purposes; this unusual triangle is not a stable one, with two sides pitted against the third.

The Federation of American Scientists, in its "Status of World's Nuclear Forces" for 2010 (Appendix 10-5, Table 10-7), estimates that China possesses about 240 warheads; India, 60-80; and Pakistan, 70-90.[24] The

number of warheads in Pakistan's arsenal has overtaken India's.

With the commissioning of two new reactors at the Chinese-built facility at Khushab, Pakistan's plutonium production capacity is expected to rise fivefold. The motivation could be threefold: to produce a large number of compact warheads that would be needed for the new long-range cruise missiles, to build new warheads for extensive deployment as battlefield weapons, or to buildup a stockpile of fissile materials so that Pakistan can subsequently acquiesce to joining the FMCT. This combination of factors poses the very real danger of escalating stockpiles beyond the requirements commensurate with Pakistan's nuclear doctrine, which is yet to be formally declared.

Missile competition in South Asia is worrisome, because conditions are so different that harking back to history is of little benefit. The only precedent we have to go by is the U.S.-USSR one, and that is not wholly relevant for a number of reasons. First, the two Cold War adversaries were continents apart, and that eliminated the risk caused by daily confrontations, stressed personnel, and local overreactions. Also, the rivals in that case were seasoned "Cold Warriors," with a sophisticated set of rules and layered formal and informal communication to reduce the possibility of mistaken launches. Finally, the technology in the Indo-Pakistan case is rudimentary, without multilayered fail-safe overrides.

Sino-Indian Context.

The nuclear situation between India and China is presently a stable one, with neither side given to exaggerated responses or threatening postures with each other. The dialogue between these two countries is

more balanced and, notwithstanding the occasional unfriendly and even hostile rhetoric, exchanges between the two countries continue at the highest political level. The risk of an unauthorized or inadvertent nuclear flare-up between India and China is therefore a remote one for the time being. But it has been the Indian experience that Sino-Indian relations have their peaks and troughs, completely dictated by Chinese tactical perceptions. At times, the Chinese adopt a reasonable attitude and suggest waiting for a "wiser generation"; at others, they raise the tempo of their rhetoric in their Government media. Chinese continuity and tenacity of purpose are proverbial, compared with other states. As Stokes and Easton have commented, China might well turn to Japan or India after having settled the Taiwan issue.[25]

The problem in the Sino-Indian context is somewhat different—it lies in the huge disparity between the force levels of the two sides, which raises the question of whether India will be sucked into an arms race.

A reference to Appendix 10-3, Table 10-5, will show that India has an estimated total of 150 missiles of which about 130 are SRBMs of the 350-km range and below. The Agni series of missiles is under production only in the shorter range (Agni II MRBM) version as the IRBMs (Agni III and Agni V) are still under development.

In comparison, China (Appendix 10-1, Table 10-1) has over 1,100 SRBMs, about 90 MRBMs, 20 IRBMs, and about 40 ICBMs. While the numerical superiority alone is vast (about 1,300 to 150), the adverse ratio (for India) in the number of missiles that each can bring to bear on the other's targets is much more pronounced—since Indian missiles that can reach Chinese targets are very few at present, and even these

cannot reach the value targets in the Chinese Northeast and East. In contrast (Appendix 10-4, China - Missile Deployment), China has the DF 3, 4 IRBMs, and DF 21 MRBMs bases located in the Qinghai province of Tibet (distance to Delhi approximately 2,500 km), and the same missiles together with DF 5 ICBMs in Yunnan Province in Southern China, which is also approximately the same distance.

In short, there can be no comparison between the ballistic missile forces of the two countries. India has therefore taken the pragmatic approach that it cannot and will not seek parity with China, and that its nuclear force levels will be built up only to the extent that its "minimum credible deterrent" doctrine requires. India has declined to specify a numerical ceiling, since this would obviously be related to China's force structure, albeit at a lower level. But the fact that parity is not an objective has been stated at fairly high official levels.[26] If India were to attempt parity with China, it would set in train an arms race that would be disastrous to it from every point of view. With the Indian economy buoyant after decades of stagnation and the stated government target of a gross domestic product (GDP) growth in double digits, it is certain that no Indian Government will sacrifice the prospect of economic progress in a futile pursuit of arms parity with China. Thus, the balance of offensive ballistic missiles is likely to be retained at some notional ratio of sufficiency, whose figure would obviously not be in the public domain.

As stated above, the current situation appears stable, and there is no looming arms race between India and China on the horizon, mainly because of India's limited objectives. But there is the uneasy prospect of the border dispute being raised at some point in the

future at a time of China's choosing, which will involve the kind of military and nuclear coercion that Taiwan is experiencing today. If that situation arises, India will have three options: to degrade China's offensive capability by enhancing its own air and missile defence capability, to increase its own offensive capability, or to negotiate a voluntary reduction of arsenals on both sides before matters reach a crisis point. The first option involves the creation of a wide area or several local missile shields and also the building up of a huge conventional military force. The second will result in the arms race that India seeks to avoid at all costs. So there appears to be only one viable option—to reach an agreement on missile limits.

A Global INF?

Such limits could be quantitative, as in the Strategic Arms Limitation Treaty (SALT) and Strategic Offensive Reductions Treaty (SORT), or qualitative, as in the INF Treaty. The INF Treaty served to give momentum to the considerable progress that has been made in arms reduction. Like every good treaty, it left all parties a little dissatisfied, but with much to be content with. The Soviets were able to achieve the virtual elimination of nuclear missile-borne weapons from Europe. The Europeans were happy, because they were not under threat from Soviet IRBMs, especially the SS-20 missiles. The British were relieved that ground launched cruise missile (GLCMs) were not going to be stationed in the United Kingdom (UK). The United States was pleased to have reduced the USSR's arsenal by 1,800-odd warheads against about 850 of its own, and to roll back the highly accurate MIRV SS-20 missiles at the same time. But now the

Russians have repeatedly said that they do not believe that the INF Treaty is relevant anymore, since it was signed in a different era—with Europe divided into the Warsaw Pact and NATO. Now some Eastern Bloc countries have been enrolled in NATO, and Russia needs IRBMs—probably to be able to deploy them as a counter to Chinese missiles deployed against Russia. Russia is pressing for the globalization of the INF, and has expressed its intention to withdraw from the Treaty, as it is entitled to do if its national interests are threatened.[27] If a global INF were to come into being, it would mean that the embargo on missiles between 500- and 5,500-km range would apply to Britain, France, and China as well. It would make no difference to Britain and France, who do not have any land-based missiles. But the embargo applies in a big way to China, since, in their present form, the INF criteria would eliminate all but a handful of China's missiles. Clearly any scheme modeled on the INF would have to be specially tailored to make even a beginning in reducing China's threat perceptions, which cover the total range spectrum, from short (Russia, South Korea, Taiwan, and Japan) to medium and intermediate (Russia, India, and Japan), to Intercontinental (United States, Europe). In fact, the specified intermediate range of 5,500 km would mean that India and China would practically be in the "proscribed zone" from each other, and the shorter range proscription (less than 500 km) would make India and Pakistan weaponless against each other except for short-range ballistic missiles (SRBMs). The SRBMs, as is argued later in this chapter, is the category that needs to be eliminated. So there do not appear to be grounds for optimism about successfully devising range-based missile elimination criteria that will meet the security needs of the South Asian countries.

Missile Defense Competition.

As far as a balance in the defensive missile force levels is concerned, one can surmise that here, too, there will be a restrained approach. The same governing factors apply—China's nuclear perceptions are not predicated on Indian actions and policies, since its threat perceptions are entirely focused on the United States. This would probably result in China concentrating its effort on building an extensive missile shield over its vital nuclear assets to keep its retaliatory capability intact. Since India cannot afford to indulge in an arms race, the same philosophy of sufficiency rather than parity will be the guide. Current Indian efforts to establish a missile defense cannot raise a shield over the entire country, and it is likely that the objective of missile defense may have to be concentrated on survival of the country's strategic leadership and retaliation capability—an approach very similar to China's vis-à-vis the United States.

Consequently, missile defense development by both sides may not change the equation very much, with missile defenses providing an added element of confidence in an ensured retaliatory capability rather than immunity from a strike.

India-Pakistan Context.

The dangerous competition in the subcontinental context is the deployment of SRBMs by both sides. SRBMs, being of shorter range, would necessarily have to be forward-deployed away from the direct supervision and control of higher political and military

leaders. Pakistan's doctrine, which has not been formally promulgated but has been surmised by gleaning statements from military and civilian sources, does envisage the use of nuclear weapons in a conventional scenario. Stemming from this use, it is unlikely that Pakistan will resort to a first strike "out of the blue." It envisages use of nuclear weapons as the decisive extension of the conventional battle, if that battle is going unfavorably from its point of view. In other words, risk is heightened when hostilities have broken out or are imminent.

Short-range ballistic missiles, *whether nuclear or conventionally war-headed* – if used to complement conventional forces – will be a major source of risk, since they may be used in the heat of battle. There is no way of distinguishing between an incoming conventionally tipped SRBM and a nuclear one. Any incoming ballistic missile will therefore be assumed to be a nuclear strike, and the defender will act accordingly, starting a nuclear exchange.

Thus, the biggest risk in the India-Pakistan context is an accidental, mistaken, or unauthorized missile launch, or the evaluation of an incoming conventional missile as a nuclear attack or the precursor of one.

Risk Factors in Indo-Pak Context.

1. *Deployment and Delegation.* With a long common border and its geographic characteristics, Pakistan may choose to disperse its missiles widely, and the operational preference would be for delegative rather than assertive control. Pakistani statements emphasise that the country's nuclear weapons are its great equalizer, and that they will be brought into use in a critical situation. Over time, this military teaching can erode

the inhibitive element and condition the authorized commander to err on the side of aggression.

2. *Cross-border Infiltration and Artillery Fire.* Indian and Pakistani troops are closely deployed across the line of control, and there are frequent cross-border firings (usually to cover the injection of infiltrators). This adds to the stress levels of personnel, and flash points are lowered. In a frequently crisis-ridden scenario, the cross-border firings increase the danger of an accidental or maverick launch.

3. *Exploitation of Militants and Irregulars.* From the very inception of the state, Pakistan has resorted to the exploitation of nonstate militants to conduct deniable military operations. On occasion, military personnel have conducted attacks disguised as irregulars. This is well-known and documented, and was clearly exposed during the Kargil war, when so-called Mujahideen were found to be soldiers without uniforms.[28] While not directly presenting a missile-related risk, such incidents are a potential trigger to the outbreak of hostilities, which could escalate into missile and nuclear exchanges.

4. *Recourse to Tactical Nuclear Weapons.* The frequent statements by Pakistan about the need for nuclear weapons to balance India's conventional strength give rise to the belief that battlefield nuclear weapons may be part of the Pakistani warfighting strategy. This would considerably lower thresholds and vitiate all other nuclear restraint measures. Recourse to the use of tactical or battlefield nuclear weapons will inevitably lead to nuclear escalation, and there would be a serious risk of a full-scale nuclear exchange.

5. *Ambiguity as Doctrine.* Some Pakistani experts propagate the notion that ambiguity is a part of deterrence. They have also said that nuclear weapons may

be used if certain red lines, which are not officially specified, are crossed. This is a dangerous policy: in the nuclear context, while clarity enhances deterrence, ambiguity makes risks more acute and should be eliminated.

Risk-Reduction Measures—India and Pakistan.

Both India and Pakistan have shown awareness of the ever-present danger of war between them. Since 1949, a number of measures have been instituted to lessen the risk of a border incident escalating to war. There are a number of confidence-building measures (CBMs) in force, which range across a wide spectrum of subjects, from avoidance of attacks on each others' nuclear facilities to advance notification of military exercises and also of missile launches. But there is acceptance on both sides that the observance has been somewhat less than meticulous.[29] The surest way to mitigate the risk of nuclear exchanges is obviously to address the issue of the risk of war, at which many of these CBMs are aimed. But taking the situation as it is, one approach could be to focus only on those aspects that are missile-related.

Eliminate SRBMs.

A major step forward could be the elimination of SRBMs. As has been argued, the very first detection of a ballistic missile launch, even conventionally tipped, will initiate an unintended nuclear exchange. It is this writer's view that these launches complicate an existing situation, and have no flexibility or graduated response capability that is so essential in the control of a nuclear situation. The elimination of SRBMs by both sides will considerably reduce the risks.

Eliminate Tactical Nuclear Weapons.

Tactical nuclear weapons, including nuclear mines and other static nuclear explosive devices, must be defined, eliminated if existing, and proscribed. The countries must come to an agreement that such weapons will not be made or used.

Revisit the 'Third Way.'

George Perkovich, in a 1993 article titled "A Nuclear Third Way in South Asia," had proposed a rollback to a state of nonweaponized deterrence.[30] Much water has flowed down the Ganga and the Indus since then, and many of the proposed measures are no longer possible. Weaponization has occurred, ballistic missiles have been developed and deployed, and the subcontinent is witnessing the development of anti-missile defense systems. But it may be worthwhile to revisit this subject. At the time it was published, the article had suggested that the preparation of missiles could be kept limited to a defined level. Missiles in peacetime are kept in storage separate from their warheads, and the missile airframes themselves are not ready for immediate launch. The launch of a missile from its cold, dissembled state requires several steps: The warheads and missiles have to be separately prepared and the missiles fueled before they are brought together to be mated at the launch site and loaded on the delivery system (the launcher or aircraft) and subjected to checks before and after each stage. If an agreement can be reached to pre-define a stage beyond which the missiles will not be prepared, it would eliminate

much of a risk in normal times. Further, thought can be given to the introduction of time buffers, so that the entire process is deliberate, and there is the possibility of recall at each stage.

Once this is agreed upon, the question of verification can be discussed. Perhaps a separate communication channel for missile warnings can be manned or activated when needed.

NEED TO WORK TOWARD AGREEMENT ON CRUCIAL PRINCIPLES

Concerted efforts are required to reach agreement on the principles that deterrence need not be "warhead for warhead" and that asymmetrical deterrence is a valid concept in the modern age. This can be a first step toward agreeing on ratios between the nuclear forces of the countries concerned. It is relevant here that any discourse on this aspect must recognize that the China-India-Pakistan equation does not stand in isolation, and must be viewed as part of the global nuclear balance.

CONCLUSION

Countries of the subcontinent, for better or for worse, have acquired nuclear weapons capability. This is the reality, and management of nuclear risk must proceed from this datum. Internal political stability is crucial to reach a level of mutual confidence. At present, both countries have their hands full with internal armed insurgence. In Pakistan, the threat of nuclear missiles being forcibly taken by enemies of the state cannot be disregarded, notwithstanding the

conciliatory statements in this regard from U.S. and Pakistani sources.

A major requirement is the cessation of all cross-border terrorist activity, which is aided and abetted by Pakistan. India has suffered seven heinous attacks from across the border in the last 8 years, and a repetition of such incidents may have an unpredictable response.

Transparency and clarity are the cornerstones of nuclear stability, and policies of studied ambiguity are highly risk-prone. China is playing a partisan game in South Asia, and must be involved in efforts to manage and ameliorate the critical situation in the subcontinent.

Despite enormous odds, India and Pakistan are still engaged in dialogue at the top levels of Government. These efforts lend hope and must persist if the grave risk of nuclear conflict is to be avoided.

ENDNOTES - CHAPTER 10

1. In this chapter, China is included in the term "South Asia," because of its close proximity and involvement in the security issues of the region.

2. "Yahya and Co. feared that Mujib's ascendancy would mean far greater autonomy for the long-exploited East Pakistanis, and the Pakistani army ruthlessly moved to crush the Bengali movement." "Pakistan: Mujib's Secret Trial," *TIME magazine*, August 23, 1971, available from *www.time.com/time/magazine/article/0,9171,877251,00.html*.

3. "It is now officially estimated that refugees will swell to 12 million by the end of the year. The cost to the Indian government for the fiscal year ending next March 31 may run as high as $830 million." "East Pakistan: Even the Skies Weep," *TIME magazine*, October 25, 1971, available from *www.time.com/time/magazine/article/0,9171,877316-3,00.html*.

4. Megha Bahree, "China in Pakistan," *Forbes Magazine,* February 7, 2009, available from *www.forbes.com/2009/07/02/ruba-china-pakistan-trade-sidebar.html*.

5. Claude Arpi, "Missiles in Tibet," *Indian Defence Review,* Vol. 23, No. 3, July-September 2008.

6. "A Brief History of Pakistan's Nuclear Program," Washington, DC: Federation of American Scientists, December 11, 2002, available from *www.fas.org/nuke/guide/pakistan/nuke/*.

7. [Musharraf's] "Visit to China," *The Daily Times* (Lahore, Pakistan), November 3, 2003.

8. "China is threat No.1, says Fernandes," *Hindustan Times*, New Delhi, India, May 3, 1998.

9. You E. Ji, *The Armed Forces of China*, St. Leonards, New South Wales, Australia: Allen & Unwin, 1999, p. 11.

10. Mark A. Stokes and Ian Easton, "Evolving Aerospace Trends in the Asia-Pacific Region—Implications for Stability in the Taiwan Straits and beyond," Arlington, VA: The Project 2049 Institute, May 27 2010, available from *project2049.net/documents/aerospace_trends_asia_pacific_region_stokes_easton.pdf*.

11. Stokes and Easton.

12. "Missile," *Pakistan Country Profile*, Washington, DC: Nuclear Threat Initiative, available from *www.nti.org/e_research/profiles/Pakistan/Missile/index.html*.

13. *Ibid*.

14. General K. Sundarji, *Blind Men of Hindoostan-Indo-Pak Nuclear War,* New Delhi, India: UBS Publishers and Distributors Ltd., 1993, p. xiv.

15. Robert S. Norris and Hans M. Kristensen, "Indian Nuclear Forces, 2008," *Bulletin of the Atomic Scientists*, Vol. 64, No.

5, November/December 2008, available from *bos.sagepub.com/content/64/5/38.full.pdf+html.*

16. "India will conduct its first test of the over-5,000 km range Agni-V missile within a year's time, top Defence Research and Development Organisation (DRDO) officials said on Wednesday. . . . The DRDO director-general, Dr. V.K. Saraswat, said that the Agni-V missile is 'out of the drawing board' and that 'testing and evaluation of sub-systems' of the missile is currently on." See "Agni-V Test in a Yr, Say DRDO Officials," *The Asian* Age, February 10, 2010, available from *www.asianage.com/content/agni-v-test-yr-say-drdo-officials*.

17. Oliver Jones, "Ballistic Missile Defence in the 21st Century," *E-International Relations*, March 13, 2010, available from *www.e-ir.info/?p=3462*.

18. "Why CND Opposes Missile Defence," Campaign for Nuclear Disarmament, London, UK: Mordechai Vanunu House, available from *www.cnduk.org/index2.php?option=com_content&do_pdf=1&id=108.*

19. Dr. Dingli Shen, "A Chinese Perspective on National Missile Defense," Shanghai, China: Institute for Environmental and Energy Research, Fudan University, available from *ieer.org/resource/commentary/a-chinese-perspective-on-national-missile-defense/.*

20. "Project 640: China's National Missile Defence in the '70s," *SinoDefence.com*, April 11, 2009, available from *www.sinodefence.com/special/airdefence/project640.asp*.

21. "New Framework for the U.S.-India Defense Relationship," Document Signed by U.S. Secretary Rumsfeld and Indian Minister Mukherjee, June 28, 2005, Washington, DC: National Defense University, Military Education Research Library Network (MERLN), available from *merln.ndu.edu/index.cfm?secID=175&pageID=3&type=section*.

22. T. S. Subramaniam, *"Hat-Trick of Hits," Frontline*, Vol. 26, Issue 7, March 26, 2010.

23. "India to Re-test Ballistic Missile Defence Shield," *Thaindia News*, April 11, 2010, available from *www.thaindian.com/newsportal/sci-tech/india-to-re-test-ballistic-missile-defence-shield_100346454.html*.

24. "Status of World Nuclear Forces 2010," Arlington, VA: Federation of American Scientists, available from *www.fas.org/programs/ssp/nukes/nuclearweapons/nukestatus.html*.

25. Stokes and Easton, "Evolving Aerospace Trends," 2010.

26. Kanti Bajpai, "India's Nuclear Posture After Pokhran II," *International Studies* (New Delhi), Vol. 37, No 4, October-December 2000, citing George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation*, Berkeley, CA: University of California Press, 1999, p. 440. Cites a "BJP official" as saying, "We do not seek parity with China; we don't have the resources, and we don't have the will. What we are seeking is a minimum deterrent." The remark may have been made by Brajesh Mishra, Principal Secretary to the Prime Minister (and later, National Security Advisor). See C. Raja Mohan's reference to a similar statement, which he attributes to Mishra, in his article, "Sino-Indian Nuclear Talks Vital," *The Hindu*, November 3, 1998.

27. "INF Treaty Developments-2010," in *Treaty between the United States and the Union of Soviet Socialist Republics on the Elimination of Their Immediate-Range and Shorter-Range Missiles (INF Treaty)*, Washington, DC: Nuclear Threat Initiative, available from *www.nti.org/treaties-and-regimes/treaty-between-the-united-states-of-america-and-the-union-of-soviet-socialist-republics-on-the-elimination-of-their-intermediate-range-and-shorter-range-missiles/*.

> There (have) . . . been continuing concerns in Russia that if no other countries join the Treaty, it may no longer prove useful. On 17 February, a diplomatic-military source in Moscow said that "Russia and the USA are planning to go back to the issue of prospects for keeping or revoking the INF treaty after a new START Treaty has been signed.

28. Seth C. Jones and C. Christine Fair, *Counterinsurgency in Pakistan*, Santa Monica, CA: Rand Corporation, Rand National Security Division, 2010. In Chap. 2 of this Rand-funded monograph published in May 2010, the authors give details of Pakistan's use of Mujahideens, militants, and irregulars to further its "Foreign Policy Objectives" in Kashmir.

29. A discussion on current CBMs is included in Neil Joecke, "The Indo-Pakistani Nuclear Confrontation: Lessons from the Past, Contingencies for the Future," in Henry Sokolski, ed., *Pakistan's Nuclear Future: Reining in the Risk*, Carlisle, PA: Strategic Studies Institute, U.S. Army War College, December 2009.

30. George Perkovich, "A Nuclear Third Way in South Asia," *Foreign Policy*, Issue 91, Summer 1993, p. 85.

APPENDIX 10-1

SOUTH ASIA—MISSILE HOLDINGS

China's Missile Inventory.[1]

Nos.	TYPE [NATO design]	Nos.	RANGE PAYLOAD	WARHEAD YIELD	CEP	COMMENTS
1	**DF-15/M-9** [CSS-6/ CSST-600]	350-400	600km 950kg	50-350KT	600m	M-9 is export version with GPS
2	**DF-11/M-11** [CSS-X-7]	700-750	300km 800kg	50-350KT	150m	M-11 is export version with GPS
3	**DF-3/3A** [CSS-2]	15-20	3,000km 2,150kg	3.3MT	2.5-4.0km	Road-mobile
4	**DF-21/21A** [CSS-5] [Mod 1 & 2]	50-80	2,100km 200-300kg	200-300KT	0.3-0.4km	Same missile as JL-1 SLBM
5	**DF-4** [CSS-3]	15-20	5,400+km 2,200kg	3.3MT	3.0-3.5km	Cave-based
6	**DF-5/5A** [CSS-4]	20	1,3000+km 4-5,000kg	4-5MT	0.5-3.0km	DF-5A longer-range, mobile, replacing DF-5.
7	**DF-31** [CSS-X-10]*	<10	7,200+km ?kg	100-200KT	0.5km	Land-mobile; same missile as JL-2 SLBM; to replace the DF-4. MRV/MIRV capability possible in future
8	***DF-31A***	<10	11,200+km ?kg	Single nuclear warhead, yield unknown	0.7-0.8km	Road-mobile; incorporates decoys as anti-AMD measure

Table 10-1. Ballistic Missiles.

9	**JL-1** [CSS-N-4] SLBM	12	1,770+km 200-300kg	200-300KT	1.0km	Sea-based version of the DF-21/21A
10	**JL-2** [CSS-N-5] SLBM*	0	7,200km 200-300kg?	200-300KT Possibly future MRV/MIRV		Under development; first credible sea-based nuclear-strike capability once operational

Notes:
DF: Dong Feng (East Wind)
JL: Julang (Great Wave)
CSS: Chinese Surface-to-Surface
CSS-N: Chinese Surface-to-Surface Naval
CSST: Chinese Surface-to-Surface Tactical
*Under development

Table 10-1. Ballistic Missiles. (cont.)

LACMs (600?)	ALCM/GLCM Kh-55/AS-15 (KENT)	3000km		18
	HN-1 (GLCM) HN-2 (G/SLCM)*	600km 1,500-2,000km	300-400kg; 90KT	300(?)
	DH-10	1,500-2,000km	500kg	150-300
	YJ - 63	400-500		
	TIANJIN - 1	600-1,000(?)		
ASCMs (350?)	YJ-62c	278+km		120
	STYX / CSS-N-2			100
	SUNBURN / SS-N-22*			100+
	SIZZLER SS-N- 27			50(?)

*Conversion to nuclear warhead possible

Table 10-2. Cruise Missiles.

ENDNOTE - APPENDIX 10-1

1. "China's Ballistic Missile Inventory," Washington, DC: Nuclear Threat Initiative, available from *www.nti.org/e_research/profiles/China/Missile/index.html*.

APPENDIX 10-2

PAKISTAN'S MISSILE INVENTORY

TYPE	DESIGNATION	PROPULSION	RANGE KM	PAYLOAD KG	NOS.
SRBM (125?)	HATF– 1/1A	SOLID FUEL	60-80/100	500	
	HATF-2/SHADOZ	SOLID FUEL	300	500	
	HATF-3/DF-11/M11 GHAZNAVI	SOLID FUEL	280	800	35-85
	HATF-4 DF-15 SHAHEEN/M9	SOLID FUEL	600-800	500	40(?)
MRBMs (10?)	HATF-6/M18(?) SHAHEEN-II	SOLID FUEL	2,000	500	
	HATF V GHAURI NODONG	LIQUID FUEL	1,200-1,300	1,000	12-15
	*GHAURI II	LIQUID FUEL	1,700		
IRBM*	*GHAURI III	LIQUID FUEL	2,500-3,500		

Table 10-3. Ballistic Missiles.[1]

TYPE	DESIGNATION	PROPULSION	RANGE KM	PAYLOAD KG	NOS.
LACM (10?)	HATF-VII/DH10 BABUR		700		
ALCM (10?)	HATF VIII/RA'AD		350		

Table 10-4. Cruise Missiles.

ENDNOTE - APPENDIX 10-2

1. "Pakistan Missile Overview," Washington, DC: Nuclear Threat Initiative, available from *www.nti.org/e_research/profiles/Pakistan/Missile/index.html*.

APPENDIX 10-3

INDIA'S MISSILE INVENTORY

Name/Alt.	Missile/ Propulsion	Warheads	Payload Weight	Range	Nos.
SRBMS (150?)					
Prithvi I/SS150	Ballistic/Liquid fuel	Conv/Nuc	1,000kg	150km	75-90
Prithvi-II/SS-250	Ballistic/Liquid fuel	Conv/ Nuc	500kg	250km	25
Dhanush/ Prithvi-III/SS-350	Ballistic/Liquid fuel	Conv/ Nuc	NK	350km	15
Agni-I	Ballistic/Solid fuel	Nuclear	1,000kg	700-800km	NK
*Shourya	Ballistic/Solid/ Canisterized	Conv/Nuc	>500kg	600km	
MRBMs (40?)					
Agni- (TD)	Ballistic/2 Stage Hybrid Engine	Nuclear	1,000kg	1,200-1,500km	10-20
Agni-II	Ballistic/Solid fuel	Nuclear	1,000kg	2,000-2,500km	NK
IRBMs (10)					
*Agni-III	Ballistic/Solid fuel	Nuclear	NK	3,500-4,000km	
*Agni-V	Ballistic/Solid fuel	Nuclear	NK	5,000km	
SLBMs					
*K-15 (Sagarika)	2 Stage SLBM	Conv/Nuc	600kg	700km	

Table 10-5. Ballistic Missiles.[1]

Name/ Alt.	Missile/ Propulsion	Warheads	Payload Weight	Range	Nos.
BrahMos/ PJ10	Ballistic/2 Stage Hybrid Engine	Conv	200-300kg	280-300km/ SH/SM/ GRD/AIR	
*Nirbhay	Cruise/Multiple platforms	Conv	NK	1,000km	

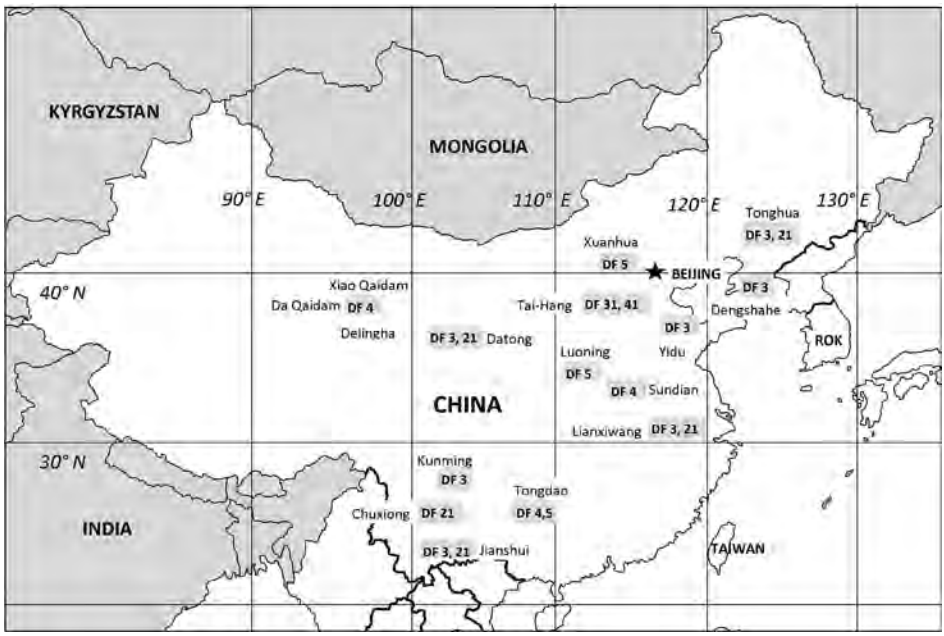
Table 10-6. Cruise Missiles.

ENDNOTE - APPENDIX 10-3

1. "Table of Indian Ballistic and Cruise Missiles," Washington, DC: Nuclear Threat Initiative (NTI), available from *www.nti.org/country-profiles/india/delivery-systems/.*

APPENDIX 10-4

CHINA- MISSILE DEPLOYMENT



APPENDIX 10-5

STATUS OF WORLD NUCLEAR FORCES - 2010[1]

Country	Strategic	Non-Strategic	Operational	Total Inventory
Russia	2,600	2,050	4,650	12,000
United States	1,968	500	2,468	9,600
France	300	n.a.	300	300
China	180?		~180	240
United Kingdom	160		<160	225
Israel	80	n.a.	n.a.	80
Pakistan	70-90	n.a.	n.a.	70-90
India	60-80	n.a.	n.a.	60-80
North Korea	<10	n.a.		
Total:	**~5400**	**~2550**	**~7700**	**~22600**

Table 10-7. World Nuclear Forces, 2010.

ENDNOTE - APPENDIX 10-5

1. "Status of World Nuclear Forces 2010," Washington, DC: Federation of American Scientists, available from *www.fas.org/programs/ssp/nukes/nuclearweapons/nukestatus.html*.