

Anti-Access Area Denial Capabilities: Implications for Strategic Stability

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Abstract

Recent advances in military technology have revolutionized warfare. Technology has broadened the scope and impact of these fundamental war-fighting concepts. Anti-Access/Area Denial tactics and strategies are not a new phenomenon in their intended roles, but advancements in missile technologies have evolved these predominantly defensive doctrines into offensive ones. This research paper intends to broaden the scope in which these technologies are commonly assessed and argues that A2/AD capabilities may not necessarily be employed only in defensive measures, rather they also offer potent weapons to carry out offensive operations against potential adversaries. This paper aims to study the trends both technological and strategic in Chinese, Russian, and Indian strategic postures and how different strategic aims and capabilities are likely to shape up future conflicts. New technological developments by states such as

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China and Russia are reshaping the military equation vis-à-vis the US military dominance in order to deter the latter from entering into their perceived areas of interest. India, being the other case, is pursuing the weapon systems that constitute A2/AD capabilities as an additional offensive element in its evolving strategic posture. Additionally, apart from the competition of big states, the proliferation of these technologies to allied and partner states would also create new security dynamics in other regions of the world. This study attempts to explain different possible uses of A2/AD capabilities and argues that their use depends on overall strategic thinking of the possessing state. If used in offensive missions, development and acquisition of A2/AD capabilities can be precursive to crisis instability by raising the risks of conflict escalation.

Keywords: Anti Access/Area Denial, Technology and Warfare, Crisis Instability, Strategic Stability, China, Russia, India.

Introduction

Traditionally, the A2/AD technologies refer to the capabilities of a state which are generally used as defensive measures against an aggressive state that attempts to intervene in the former's area of influence. This perspective has limited the scope of discussion to measures taken by China and Russia in their attempt to limit the US' ability to project power in their perceived areas of interest. This research paper intends to broaden the scope in which these technologies are commonly assessed and argues that A2/AD capabilities may not necessarily be employed only in defensive

measures, rather they also offer potent weapons to carry out offensive operations against potential adversaries. The existing body of literature recognizes that besides denying an aggressor the ability to intervene in one's area of influence, one of the motivations for a state to pursue A2/AD capabilities can also be to project power itself in its near abroad.²

To further expand the understanding on the employment of these capabilities by different states and its likely impact on strategic stability in their respective regions, this study broadly focuses on three aspects. First, how contemporary trends in technological developments have historically shaped countries' military strategies and nature of warfare over the years; second, it identifies the weapons systems that may be classified as A2/AD capabilities; third, it identifies the possible ways in which these capabilities may be employed – depending on the strategic motivations of states possessing these weapons – and how that could implicate strategic stability. Towards this end, it has been identified that besides China and Russia, India has lately shown keen interest in developing and procuring the weapon systems that may be constituted as A2/AD capabilities. While several Indian commentators point out China's alleged forays into the Indian Ocean as a threatening posture, no credible assessment suggests that India faces any threat of foreign power's intervention that merits employment of A2/AD systems. Conversely, these capabilities contribute to India's evolving military posture that aspires strategic supremacy and pursues escalation dominance strategy by conducting limited military operations against

²Terrence K. Kelly, David C. Gompert, Duncan Long, "Smarter Power, Stroger Partners Volume 1: Exploiting U.S. Advantages to Prevent Aggression," *RAND* (2016), 22.

Pakistan.³

Relationship between Technology and Warfare

Since the dawn of mankind, fighting and warfare have been a constant of human history. Broadly speaking, war fighting can be divided into attacking and defensive strategies. For a defensive force of any size, the key defensive goal is to prevent hostile forces to capture territories or areas of interest.⁴ Simple manmade defences such as trenches, bunkers, walls, and gates are still part of overall defensive doctrines of militaries around the world. China built the Great Wall to deny access to the Mongolian hordes and the European nations in the Roman times relied on the refuge from the Legions behind natural obstacles such as the Alps. Physical geography has also afforded advantages to defenders by creating hindrances against invasion. Physical hurdles such as rivers, mountains, dense forests, and deserts have dissuaded armies from undertaking expeditions. Geography, when combined with weather, has often proven disastrous for invading forces. Russia, with its great land expanse and freezing winters, has incorporated this combination in its overall military strategy; the defeat of Napoleon and later that of the Nazis can be attributed to the inhospitable Russian winters.⁵

Besides these factors, the technological developments always have a significant impact on the nature and character of warfare. Technologies leverage decision-makers in taking prompt decisions. The introduction of gunpowder not only gave armies more

³Sameer Lalwani, Elizabeth Threlked, Sunaina Danziger et.al, "From Kargil to Balakot: Southern Asian Crisis Dynamics and Future Trajectories," *Stimson Center*, Policy Paper, February 2020, available at: <https://www.stimson.org/2020/from-kargil-to-balakot-southern-asian-crisis-dynamics-and-future-trajectories/>(Accessed on April 10, 2020).

⁴Arthur Stanley Riggs, "The Evolution of War," *The Scientific Monthly*, Vol. 54, no. 2 (1942), 110-124.

⁵Claudio Cioffi-Revilla, "Origins and Evolution of War and Politics," *International Studies Quarterly*, Vol. 40, no. 1(1996), 1-22.

destructive power to destroy defences, but it also increased the lethality and effectiveness of military operations. The advent of gunpowder and reliance on projectile weapons propelled through gunpowder also evolved the tactics and strategies available to defenders. Defensive weapons such as land and sea mines were some of the earliest methods to deny access to enemies. During the 20th century, mines were extensively used on both land and sea in huge quantities; and apart from the physical effect, they had a great physiological impact on opposing forces.⁶ States have historically directed their defence research to seek innovation and achieve a position of monopoly or dominance until that advantage is neutralized by newer technological innovations. The technologies that tend to increase one side's security at the cost of others shall continue to negatively impact stability between the states.

Until the world did not witness direct implications of technological developments, technology had a little role in warfare. This is also evident from the fact that even the strategists like Clausewitz did not include technology as a variable in their understanding of war.⁷ This aspect attracted significant focus around the nineteenth century because of three factors – as identified by Warren Chin – including the impact of Industrial Revolution, state sponsorship of technological innovation for military purposes, and the advent of the nuclear age.⁸ The nuclear revolution altered the character of warfare, which was initially seen as an "act of violence to compel our component to fulfill our will".⁹ The notion of nuclear deterrence emerged as a substitute for organized violence and rendered the objective of any strategy, as Bernard Brodie called it, to avert the possibility of war by deterring a

⁶Webster David, "Warfare and the Evolution of the State: A Reconsideration," *American Antiquity*, Vol. 40, no. 4(1975), 464-70.

⁷Warren Chin, "Technology, War and the State: Past, Present and Future," *International Affairs*, Vol. 95, no. 4(2019), 767.

⁸Ibid.

⁹Carl von Clausewitz, *On War* (Princeton: Princeton University Press, 1976), 77.

potential aggressor.¹⁰ Nevertheless, as Barry Buzan observed, nuclear deterrence remained sensitive to technological innovations and required states to continue developing military technologies to ensure the credibility of deterrence for national security against adversary's capabilities.¹¹ The advent of nuclear weapons triggered a significant transformation in the nature and character of warfare. This fifth military revolution established the notion of Mutually Assured Destruction (MAD) that made modern war an unthinkable option.

While the nuclear deterrence reduced the likelihood for war, it could not arrest the basic political motive to compete for strategic superiority in the global system. This phenomenon generated the arms race and led to the introduction of new technologies, which consequently facilitated new forms of conflict.¹² Mutual vulnerability, as a baseline concept of nuclear deterrence, did not discourage states from pursuing supremacy through competition and aggression. Rather, states confront a blurred line between peace and war as different actors employ a host of tactics to achieve their policy objectives, while avoiding an outbreak of hostile confrontation. This use of war as a political tool in the nuclear age reasserted the belief in what Clausewitz propagated that war is nothing but the continuation of policy by other means.

Anti-Access Area Denial Technologies in the 21st Century

As a military strategy, Anti-Access Area Denial (A2/AD) refers to the ability to prohibit access and limiting adversary's freedom of action by denying it the opportunity to conduct any hostile action.¹³ It is based

¹⁰Steven E. Miller, *Strategy and Nuclear Deterrence* (Princeton: Princeton University Press, 2014), 44.

¹¹Barry Buzan, *Military Technology, and International Relations* (London: Macmillan, 1987), 216.

¹²Warren Chin, "Technology, War and the State: Past, Present and Future," *International Affairs*, Vol. 95, no. 4(2019), 765.

¹³Ionuț Alin Cîrdei, "A2AD Concept in the Modern Security Environment," *International Conference*, Vol. XXIV, no. 1(2018), 51.

on the ability to prevent an adversary from deploying military forces in one's perceived area of strategic interest. The U.S. Department of Defence's Joint Operational Access Concept notes that "Anti-Access refers to those actions and capabilities, usually long-range, designed to prevent an opposing force from entering an operational area [while] Area-denial refers to those actions and capabilities, usually of shorter range, designed not to keep an opposing force out, but to limit its freedom of action within the operational area".¹⁴ In short, A2/AD signifies limiting adversary's ability of power projection.¹⁵ The evolution of technology has made surveillance of extended areas and prompt military intervention possible. A2/AD, therefore, relies on synergy and integration of different capabilities. Few examples of A2/AD capabilities include integrated air defence systems, anti-ship and anti-submarine warfare capabilities (ASW capabilities), mobile missile systems, hunter-killer submarines, anti-satellite weapons, space surveillance infrastructure, and so on.¹⁶

The development of A2/AD capabilities has gained momentum and prominence in the current era. China and Russia are at the forefront of these developments. In view of the regional and extra-regional ambitions while confronting serious security threats from military deployments of the US particularly in the South China Sea and Eurasia, they lack sufficient military muscle when compared to

¹⁴"Joint Operational Access Point," *U.S. Department of Defence*, 17 January 2012, available at: https://archive.defense.gov/pubs/pdfs/JOAC_Jan%202012_Signed.pdf, (Accessed on April 07, 2020).

¹⁵Robert Koch and Mario Golling, "Blackout and now? network centric warfare in an Anti-Access Area-denial theatre," *The NATO Cooperative Cyber Defence Centre of Excellence* (2015), 173.

¹⁶"China's Anti-Access Area Denial," *Missile Defence Advocacy Alliance* (August 24, 2018), available at: <https://missiledefenseadvocacy.org/missile-threat-and-proliferation/todays-missile-threat/china/china-anti-access-area-denial/> (Accessed on March 10, 2020).

the US.¹⁷ Since the end of the Cold War, the US enjoyed almost unopposed superiority in terms of naval and air power development and power projection capabilities. The Soviets and the Chinese had historically focused their developments on large ground forces that were designed to suppress the enemy by their sheer numbers. This doctrine had its origins in the successes of the Soviets in the Second World War where technologically inferior but numerically superior Soviet forces had triumphed over the Nazi Germany. The Chinese who were allied with the Soviets at the start of the Cold War, not only adopted the Soviet-designed equipment but also their war fighting doctrines and strategies primarily during the Korean War and later during the border war with Vietnam.¹⁸

The technological prowess of the American military amassed during the Cold War was unleashed against Soviet-trained and equipped Iraqi forces during Operation Desert Storm. The utter and total destruction of the Iraqis by the American and their NATO allies shaped up the Chinese military thinking at the turn of the century. China, recognizing its shortcomings vis-à-vis the US started a major force modernization plan where the Chinese military forces were to be made lean, technologically upgraded and the war fighting doctrines were remade to fight a quick and decisive fight instead of relying on massive manpower.¹⁹

Advancements made in missile technology, primarily in conventional strike missiles, have given countries more options when it comes to defensive actions. Shore-based Anti-Ship Missiles (ASMs) have extended the range and efficacy of the concept of land-based seas denial strategies. The prime example of this kind of warfare in

¹⁷John Gordon and John Matsumura, *The Army's Role in Overcoming Anti-Access and Area Denial Challenges* (Santa Monica, CA: RAND Corporation, 2013).

¹⁸Vincent Alcazar, "Crisis Management and the Anti-Access/Area Denial Problem," *Strategic Studies Quarterly*, Vol. 6, no. 4(2012), 42-70.

¹⁹Ibid.

recent history was the Iran-Iraq war where both sides had employed ASMs to disrupt shipping in the Persian Gulf. Long-range surface-to-air missile (SAM) systems have also enabled militaries to gradually shift to area defence concept from the point-defence concept which focuses on the protection of a single asset. These long-range missiles now afford the operators with extended strike capabilities, blurring the lines of just being defensive or offensive weapons.²⁰ Another difference in the A2/AD capabilities compared to the past is that modern capabilities are more intelligent, controllable, and ever-present. Unlike the employment of artillery barrages or landmines that would be indiscriminate and temporary, modern A2/AD capabilities have the ability to deter at extended ranges and for extended periods of time.²¹

Requirements of an Effective A2/AD Strategy and Capability

In order for an A2/AD strategy to work, there is a need to develop highly integrated and overlapping capabilities that encompass all mediums of military operations i.e. land, air, sea, and even space so as to deny the adversary any avenue to approach one's area of interest. Through a multi-layered system, A2/AD capabilities can potentially detect and hit the adversary's forces and thus serve as quasi-defensive weapons. Thus, the defensive use of these capabilities may serve as an effective deterrent against any potential aggressor. At the same time, these capabilities also offer potent tools for offensive military operations and its mere possession may tempt the aggressor to carry-out punitive conventional strikes against a nuclear-armed state and thus may have strategic implications. This paper sheds light on both of these possibilities and offers an assessment of how different states may use these capabilities to undertake a different range of missions and pursue their strategic

²⁰Alcazar, Ibid.

²¹Gordon and Matsumura, Ibid.

interests. For countries like China and Russia, A2/AD capabilities may be a response to the US pre-eminence and its extra-regional power projection capabilities; however, for countries like India, these capabilities offer potent tools to conduct low-intensity offensive military operations.

In the modern times, military operations are conducted in a myriad of mediums and operational conditions. Advancements in communications, surveillance, detection, and long-range engagements still suffer from the fog of war. The conduct of effective military operations is now dependent on numerous kinetic and non-kinetic means to achieve goals and objectives. As capabilities grow, there is a growing need to integrate assets while also increase cohesion between the various military assets and services.²² The advantages of modern A2/AD systems are unlike the defensive capabilities of the past such as walls, mines, and trenches, etc., these capabilities allow the possessor to engage adversaries at extended ranges. However, this comes with its own set of challenges as the risks of fratricides in the absence of an effective Identification Friend or Foe (IFF) mechanism. Likewise, an all-encompassing Information, Intelligence, Surveillance, and Reconnaissance (I2SR) capabilities are necessary to locate, chart, map, and engage adversaries at the desired ranges.²³ China and Russia both are developing systems that are mobile; this has numerous benefits as these systems can be moved to theatres that need them the most, while their mobility also aids in these systems to be more survivable by employing shoot and scoot tactics.

²²Andreas Schmidt, "Countering Anti-Access/Area Denial: Future Capability Requirement in NATO," *Joint Air Power Competence Centre (JAPCC) Journal*, Vol. 23(2016), available at: <https://www.japcc.org/countering-anti-access-area-denial-future-capability-requirements-nato/> (Accessed on March 18, 2020).

²³Ibid.

Drivers for A2/AD in the 21st Century

China

The principal developer of A2/AD systems and strategies is the People's Republic of China. China operates "a series of interrelated missile, sensor, guidance, and other technologies designed to deny freedom of movement" to the US and its allies.²⁴ Observers note that China started contemplating the A2/AD strategy in the mid-1980s and, as noted earlier, got further impetus after the 1991 Persian Gulf War.²⁵ The reasons for China's development of these capabilities are not just confined to America's edge in military power projection but are also rooted in its history of occupation by regional and extra-regional powers.²⁶ The Western thinkers assert that China sees A2/AD capabilities as a means to rebuild its military prestige and these capabilities may allow Beijing to deter and defeat its technologically superior opponents.²⁷ Washington heavily relies on unimpeded force movements across several regions to ostensibly stabilize the global security environment and ensure its supremacy.²⁸ Beijing sees A2/AD as a military strategy based around restricting opponent's access to a certain strategic locations, while it exerts forceful control over its

²⁴Stephen Biddle and Ivan Oelrich, "Future Warfare in the Western Pacific: Chinese Anti Access/Area Denial, U.S. Air Sea Battle, and Command of the Commons in East Asia," *International Security*, Vol. 41, no. 1(2016), 7.

²⁵"An Anti-Access History Lesson," *The Diplomat*, May 25, 2012, available at: <https://thediplomat.com/2012/05/an-anti-access-history-lesson/>(Accessed on April 07, 2020).

²⁶Eduardo A. Abisellan, "CENTCOM's China Challenge: Anti-Access and Area Denial in the Middle East," *The Brookings*, Report, June 28, 2012, available at: <https://www.brookings.edu/research/centcoms-china-challenge-anti-access-and-area-denial-in-the-middle-east/> (Accessed on January 28, 2020).

²⁷Sam Goldsmith, "China's Anti-Access & Area-Denial Operational Concept and the Dilemmas for Japan," MA dissertation, (Australian National University, 2012), 28, available at: <https://core.ac.uk/download/pdf/156621555.pdf>(Accessed on April 07, 2020).

²⁸Vincent Alcazar, "Crisis Management and the Anti-Access/Area Denial Problem," *Strategic Studies Quarterly*, Vol. 6, no. 4(2012), 42.

perceived areas of legitimate interest, such as Taiwan. A2/AD strategy is believed to be one of the most serious challenges confronting the US military deployments in the Pacific.

A2/AD is an asymmetric option being developed and adopted by China to deter or defeat a superior military power such as the US and its regional partners and allies like Japan. The core concept of these developments is to have the ability to attack the adversary's weak point through limited yet pinpoint offensive actions. One of the chief reasons for the Chinese development of A2/AD capabilities is the presence of the US along with its allies in North-East and South-East Asia. Both these regions have historically been under China's sphere of influence. Given the fact that the US has military presence in South Korea, Japan, and Guam and that the US and China are at odds when it comes to the issue of South China Sea (SCS) and Taiwan, the Chinese have opted for a land-based conventional yet evolved deterrent mechanism by which to dissuade not only the US but also its regional allies.²⁹ As the contested areas of Taiwan and SCS are naval theatre of operations and the People's Liberation Army Navy (PLAN) has limited capabilities when compared to the US and its allies, it has adopted a land-based sea-denial strategy as a stopgap measure while simultaneously developing its maritime capabilities.

China's 2015 defence White Paper asserted that "the traditional mentality that land outweighs sea must be abandoned...It is necessary for China to develop a modern maritime military force structure...so as to provide support for building itself into a maritime power."³⁰ There have been sporadic episodes of escalations in the Taiwan Strait, the Straits of Malacca and parts of the SCS. China needs equalizing capabilities to deter unopposed naval actions. Given

²⁹Ibid.

³⁰Malcolm Davis, "Towards China's A2AD 2.0," *The Strategist*, ASPI, November 27, 2017, available at: <https://www.aspistrategist.org.au/towards-chinas-a2ad-2-0/> (Accessed on March 02, 2020).

China's strategic behavior and restrained political ambitions, it is unlikely that China would use a large fleet comprising of multiple aircraft carriers to extend its naval reach to distant regions. Nevertheless, the capability may be used to have sustained presence in near waters and along key Sea Lines of Communications (SLOCs) for protection of economic interests.

In recent times, SCS has emerged as an area of competition amongst several regional and extra-regional powers. Besides the Korean Peninsula and the Taiwan Strait, the South China Sea is generally seen as another flashpoint in the region for the potential conflict of national interests. The growing military deployments and contesting claims by the rival states threaten its peace and security. Security issues in this region therefore always remain a focus of international concern. The seabed around this group of islands and reefs is believed by some to be rich in hydrocarbons such as oil and natural gas, and the atolls, archipelagos, and islets are of immense strategic importance for sea-lane defence, interdiction, and surveillance for both major and minor powers. To project its military power and exhibit influence in the SCS, China has undertaken an ambitious military infrastructure build-up plan. In this military posture, China is converting small islands into military bases that are designed to be used to harbor naval vessels, host its troops, and fighting jets. These bases can be seen as part of the overall Chinese A2/AD strategy in the naval or combined arms domain, where the placement of military assets in and around contested waters would act as a deterrent not only by their mere presence but also through the ability to swing into action in the minimum amount of time. China is expanding its Naval Aviation Wing, not only in terms of numbers but their intended roles and capabilities as well. These A2/AD capabilities are further backed by conventional anti-ship missiles as well as cruise missiles that can be effective against hostile naval elements.

Another emerging factor that adds to destabilize the naval equation and hence the strategic stability for China is the emergence and formation of the Quadrilateral grouping, also called as the Quad. Compromising of the US, Japan, Australia, and India, this group is envisioned to facilitate naval operations in the Pacific as well as the Indian Oceans. China's perceived vulnerabilities have been compounded by this development especially in the maritime domain as the threat is from multiple geographic and regional directions with limited Chinese maritime assets to counter them.³¹ The Chinese thinkers believe that the US military deployments in the region aim to encircle China.³²

One of the serious complicating factors in the Sino-US relationship has been the US policy on deployment of Ballistic Missile Defence (BMD) systems in the Asia-Pacific and its assistance to its Asian allies in this regard. US has signed multiple agreements with Japan and South Korea on conducting joint research and deployments of multi-tiered BMD systems – including THAAD, Aegis, and Patriot systems. China views these developments as a part of the American strategy to contain China and has been concerned that these deployments are incorporated against Beijing into a region-wide system in East Asia. Luo Gang, from the Chinese Armament Command Department, opined that missile defense was creating a 'missile blockade' along China's eastern flank.³³ Dai Xu, Chinese Air Force Colonel, and a renowned scholar terms the US BMD deployment as a neo-containment strategy against China and opines that “the ring begins

³¹Ibid.

³²Chris Buckley, “PLA researcher says U.S. aims to encircle China,” *Reuters*, November 28, 2011, available at: <https://www.reuters.com/article/us-china-usa-pla/pla-researcher-says-u-s-aims-to-encircle-china-idUSTRE7AR07Q20111128> (Accessed on April 07, 2020).

³³Luo Gang, from the Chinese Armament Command Department, opined that missile defense was creating a 'missile blockade' along China's eastern flank. Quote cited in Eric Hagt, 'China's ASAT Test: Strategic Response', *China Security*, (Winter 2007), 45.

in Japan, stretches through nations in the South China Sea to India, and ends in Afghanistan. Washington's deployment of anti-missile systems around China's periphery forms a crescent-shaped encirclement."³⁴

The Chinese label the strategy of A2/AD as "active defence". The US Department of Defence defines active defence as:

Active defence is based on the capability to rapidly project force in response to external threats, seizing the initiatives at the outset of the conflict ... a defensive military strategy in which China does not initiate war or fight wars of aggression, but engages in war only to defend national sovereignty and territorial integrity. Once hostilities have begun, the essence of active defence is to take the initiatives and to annihilate the enemy.³⁵

By this definition, China maintains a defensive strategy that relies on aggressive capabilities. China is believed to be developing effective A2/AD capabilities in order to offset the advantages that the superior US military continues to enjoy. China has developed numerous land-based systems to penetrate the defences of the US Naval flotillas that are dependent on point and localized air defences. China may not be able to equally match the US naval prowess in terms of numbers and technology. But to counter this, the Chinese offset strategy relies on overwhelming these defences by attacking with numerous different systems such as ballistic missiles with highly accurate targeting such

³⁴Qin Jize and Li Xiaokun, "China circled by chain of US anti-missile system," *China Daily*, February 22, 2012, available at: http://www.chinadaily.com.cn/world/2010-02/22/content_9481548.htm (Accessed on March 14, 2020).

³⁵"Military and Security Developments Involving the People's Republic of China 2018," Annual Report to Congress, *US Department of Defence*, August 16, 2018, available at: <https://media.defense.gov/2018/Aug/16/2001955282/-1/-1/1/2018-CHINA-MILITARY-POWER-REPORT.PDF> (Accessed on February 9, 2020).

as Df-21D and Df-41, anti-ship cruise missiles (ASCMs) launched from land, surface or subsurface naval platforms as well as by aircraft.³⁶ Though A2/AD capabilities do not substitute for an extended range into the Oceans, they serve as a significant challenge to adversary's forward deployments. China has developed shore-based anti-ship ballistic missiles (ASBMs) as a significant element of its A2/AD capabilities. The ASBMs are advantageous primarily on two accounts: First, ballistic flight trajectory poses the challenge of interception and calls for a sea-based BMD capability that is costly; Second, they offer a greater range as compared to anti-ship cruise missiles.

China also deploys multiple diesel-electric submarines, equipped with torpedoes and small anti-ship cruise missiles (ASCMs) that could be used in anti-submarine warfare operations. China is also fast developing shore-based anti-ship cruise missiles that are equally useful against high-value and lightweight targets. The shore-launched anti-ship delivery systems are generally deployed on trucks to ensure better mobility that significantly enhances the survivability of these weapon systems by allowing relocation in case their position is compromised. Likewise, it also offers a rapid transition from one area of interest to another. Other Chinese platforms to launch ASCMs are missile boats and maritime strike aircraft that rely on mobility and stealth to avoid counteraction by the adversary. China's YJ-18 family of cruise missiles can hit targets at ranges of about 290 nautical miles.³⁷ This offers a cost-effective and potent military advantage against adversary's carrier battle groups intruding into China's acclaimed waters.³⁸ Besides these capabilities, China has also

³⁶Hans M. Kristensen and Robert S. Norris, "Chinese Nuclear Forces, 2015," *Bulletin of the Atomic Scientists*, Vol. 71, no. 4(2015), 78.

³⁷Michael Pilger, "China's New YJ-18 Antiship Cruise Missile: Capabilities and Implications for U.S. Forces in the Western Pacific," Staff Research Report, *U.S.-China Economic and Security Review Commission*, October 28, 2015.

³⁸Ibid.

developed an anti-satellite (ASAT) missile as part of its A2AD capabilities.

An effective implementation of A2/AD strategy requires the availability of a range of effective Command, Control, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) capabilities. Over the years, China has been able to develop an advanced network of communications relying on fiber-optics that accords its military with higher communication speed, reliability, and security. This network also connects the coastal and offshore military facilities with Chinese Civil leadership. China is also investing heavily in developing credible and robust surveillance systems to monitor coastal areas of strategic importance. Along with these measures, China is also developing its combat readiness which is essential for the conduct of A2/AD operations through the combination of its kinetic, non-kinetic, and C4ISR capabilities. To have control over airspace, China established air-defence identification zone referred to as 'The East China Sea Air Defense Identification Zone' in 2013. The zone includes the airspace within the area enclosed by the outer limits of China's territorial waters. Western observers have been skeptical of China's A2/AD strategy and consider it to be a tool to disrupt and deny the US military forces access to the Western Pacific.

Another interesting aspect of the Chinese offset strategy is the construction or expansion of natural islands in contested areas for the deployment of military forces. These islands also afford China the ability to create physical chokepoints in contested waters. The deployment of military assets on these islands further extends the range of its A2/AD systems. To assert control over airspace Beijing has established air-defence identification zone referred to as 'The East China Sea Air Defence Identification Zone' in 2013. The zone includes the airspace within the area enclosed by the outer limits of China's

territorial waters.³⁹ To further assert dominance over the airspace, the Chinese are equipping themselves with the much-hyped long-range SAM systems such as the S-400, S-500 from Russia as well as their own indigenous iterations of these systems like the HQ-16 and HQ-19.

China now also has a burgeoning aviation industry that can play a pivotal role in the development of China's A2/AD capabilities. Aerial assets can be employed in I2SR roles along with long-range target engagements. China is also developing their naval air arm to operate at extended ranges. These aircraft will not only operate from China's aircraft carriers but will make use of the airstrips being constructed along China's coast and islands.⁴⁰

These capabilities signify that China does not pursue sea-control or dominance as a matter of policy; rather it largely focuses on the strategy of sea-denial that renders Chinese coastal waters unsafe for the intruding adversaries.⁴¹ The above-mentioned capabilities help China prevent the opponent's military forces from infringing into Beijing's perceived area of strategic interest.

Russia

Disintegration of the USSR led to the demise of the military industry in Russia. Insufficient funding and dire economic situation in the 1990s led to the mothballing of not only several military assets but also the research and development facilities.⁴² The Russian military and defence industry have undergone a rapid transformation as

³⁹Ibid.

⁴⁰Ibid.

⁴¹Tong Zhao, "Tides of Change: China's Nuclear Ballistic Missile Submarines and Strategic Stability," Report, *Carnegie Endowment for International Peace*, October 24, 2018.

⁴²Gustav Gressel, "Russia's Quiet Military Revolution and What it Means for Europe," *European Council on Foreign Relations*, October 12, 2015, available at: http://www.ecfr.eu/publications/summary/russias_quiet_military_revolution_and_what_it_means_for_europe4045 (Accessed on April 10, 2020).

newer systems are being developed and deployed. To Russia's ire, NATO has constantly encroached on its borders, absorbing several former USSR states into its fold.⁴³

In the European theatre, the US presence has never subsided; the troop presence along with the political influence over the European States creates security imperatives for Russia. In recent times, the US has pulled out of bilateral arms limitation treaties such as the Intermediate Range Nuclear Forces treaty (INF) citing Russian developments in missile systems to be in violation of the treaty. The US deployment of its multi-tiered Ballistic Missile Shield (BMD) has also complicated the strategic stability vis-à-vis Russia where Russia has started developing systems such as stealth aircraft and Hypersonic Glide Vehicles (HGVs) to bypass these threats. Similarly, the development of medium-range ballistic missiles such as the *Tochka* gives Russia a flexible option of countering NATO troop concentrations with either conventional or unconventional warheads.⁴⁴

Russia's threat perception in Europe is not just confined to the US but also arises from the various NATO allies. The annexation of Crimea by Russia further fueled tensions as the US and its European allies provided to military support to Ukraine through arms and training. As Russia continues to assert its presence in the region, it is only natural that the opposing side will maneuver to counter it.⁴⁵ Russia, like China, is fast trying to technologically catch up with the US and NATO while developing capabilities such as advanced and well-integrated ground-based air defence networks to negate the

⁴³Andrew F. Krepinevich, Barry Watts and Robert Work, "Meeting the Anti-Access and Area-Denial Challenge," Report, *Center for Strategic and Budgetary Assessments*, May 20, 2003, available at: <https://csbaonline.org/research/publications/a2ad-anti-access-area-denial> (Accessed on January 14, 2020).

⁴⁴Ibid.

⁴⁵Ibid.

advantages enjoyed by US and NATO. Moscow is also rapidly developing electronic and jamming capabilities.⁴⁶ Russia, like China, is also cognizant of the naval supremacy that the US and NATO enjoy and hence has started programs to bolster its coastal defences in order to deter naval threats. In this regard Russia is developing land-based anti-sea weapons that would in combination with its Naval Aviation assets offer some sort of A2/AD in the naval domain.

The proliferation of these systems elsewhere is also changing the regional balance of power. In recent times, a fragile and sanction riddled Russian economy has made Moscow turn to its arms industry to generate cash flow. The S-300 and S-400 systems have proved to be the stalwarts of Russian military industries, enticing not only traditional customers but also NATO members such as Turkey.⁴⁷ Likewise, the sale of S-300s to Iran and Syria helps to counter the US presence in the region and to provide a deterrent against regional allies of the US including the Kingdom of Saudi Arabia and Israel. Considering the unique advantage of Saudi Arabia and Israel in aerial power in the region, S-300s would be crucial for Syria and to maintain some semblance of a conventional deterrent against their respective adversaries in the region.⁴⁸

India's Interest in A2/AD Capabilities and Possible Offensive Use

India is also benefitting from these technologies, as it is acquiring S-

⁴⁶Robert Martinage, "Toward a New Offset Strategy," Report, *Center for Strategic and Budgetary Assessment*, October 27, 2014, available at: <http://csbaonline.org/publications/2014/10/toward-a-new-offset-strategy-exploiting-u-s-long-term-advantages-to-restore-u-s-global-power-projection-capability/> (Accessed on May 14, 2020).

⁴⁷Lius Simon, "Demystifying the A2/AD Buzz," *The War on the Rocks*, January 4, 2017, available at: <https://warontherocks.com/2017/01/demystifying-the-a2ad-buzz/> (Accessed on February 1, 2020).

⁴⁸Ibid.

400s from Russia. Though it is not currently known whether these long-range SAMs are to be employed as part of India's BMD or as conventional anti-aircraft weapons. These inductions in any case will alter the deterrence and strategic stability in the South Asian region as both China and Pakistan will develop capabilities to counter the threat.⁴⁹

Given the geographical limitations of Pakistan's military deployments particularly its Air Force, the S-400 has the ability at least on paper to target the Pakistani Air Force aerial assets as they take off from their air bases. Though the efficacy of the system at these extended ranges remains to be seen. For Pakistan, the limitations due to the induction of such systems mean developing capabilities that afford some sort of normalcy to the conventional balance of power. For the South Asian region, such offensive capabilities may translate into disastrous consequences given the history of conflict and mistrust that exist between the two nuclear-armed neighbors.

Another challenge that such systems bring into the equation is the question about the kind of response the targeting of such a system would evoke in a crisis or conflict situation. The challenge for India is how to deploy the S-400 batteries where they can be used both in the anti-aircraft as well as BMD roles, while for Pakistan the challenges to counter such systems are numerous.

India's growing anti-submarine warfare capabilities pose a grave danger to regional peace and stability. These capabilities do not only aim to prevent adversarial naval forces from entering into India's littoral waters but also may enable the country to pre-emptively use

⁴⁹Robert Farley, "A2/AD is Dead, Long Live A2/AD: Has one of our favorite buzzwords died?," *The Diplomat*, October 11, 2016, available at: <https://thediplomat.com/2016/10/a2ad-is-dead-long-live-a2ad/> (Accessed on May 14, 2020).

these capabilities against enemy's sea-based deterrent force, thus posing serious dangers to latter's nuclear survivability. Reports suggest that the Indian Navy aims to raise an unmanned submarine squadron by 2021 and has started the process to procure eight high performance autonomous underwater vehicles.⁵⁰ For the past few years, Defence Research and Development Organization (DRDO) has been designing and developing multiple Autonomous Underwater Vehicles (AUVs) to meet futuristic requests of the Indian Navy. In April 2016, DRDO developed an autonomous underwater prototype fish-shaped vehicle capable of speed up to 7 kmph at depths of up to 300 meters below sea level.⁵¹

Manohar Parrikar, the Indian Defence Minister, informed the Indian Parliament in 2015 that DRDO was capable of designing various kinds of Unmanned Underwater Vehicles (UUVs) from hand-held slow-speed ones to military-class platforms.⁵² Visakhapatnam-based Naval Science and Technology Laboratory (NSTL) also runs the 'Autonomous Sea Vehicle' (ASV) program on the lines of the US Navy's 'Manta Unmanned Underwater Vehicle', to build larger AUVs weighing more than 12 tonnes. These AUVs can carry a payload of 500 kg and operate up to 500 meters below the sea surface. India is also producing submadrones—a swimming spy plane—that can be launched from submarine tubes and deploy in reconnaissance mode for a fixed time period.

⁵⁰“Indian Navy Looks to Raise High Performance Unmanned Submarine Squadron by 2021,” *Sputnik News*, 26 July 2018, available at: <https://sputniknews.com/asia/201807261066709924-indian-navy-unmanned-submarine/> (Accessed on April 07, 2020).

⁵¹Abhijit Singh, “Unmanned & Autonomous Vehicles and Future Maritime Operations in Littoral Asia,” Special Report, *Observer Research Foundation*, July 28, 2016.

⁵²Huma Siddiqui, “Keeping an eye, underwater,” *Financial Express*, April 6, 2015, available at: <https://www.financialexpress.com/economy/keeping-an-eye-underwater/60807/> (Accessed on March 4, 2020).

India has been using *Samudra* AUV for deep-sea exploration. The on-board image processing unit enables it to undertake 'path detection, obstacle avoidance, and target identification' under the sea. Students at the Indian Institute of Technology-Bombay have been working on *Matsya* AUV that can ensure constant monitoring and immediate intelligent action during military operations, thus eliminating the chance for human error. There are currently 100 small and large industries in India that are designing and producing navigation and communication systems as part of anti-submarine warfare for the Indian naval warships. Kerala based twenty-five industries are collaborating with Kochi-based Naval Physical and Oceanographic Laboratory (NPOL) to develop the Indian sonar system.⁵³

India is also one of the fastest and more aggressive spaces faring nations. In a short span of time, India has not only mastered the science of designing, manufacturing, and launching space assets, it has also forayed in the domain of militarizing the medium as well. India's ASAT test in 2019 has demonstrated that India aspires to be not only a regional but global power as well. Apart from its ASAT capability, India has already developed the requisite I2SR, communication, and navigational space assets to make itself a formidable military power that can conduct A2/AD warfare on its frontiers.

Implications for Strategic Stability

The development of A2/AD capabilities parallels the development and deployment of nuclear weapons due to the fact that both these

⁵³Sudha Nambudiri, "25 industries from Kerala assisting DRDO in developing indigenous Sonar," *The Times of India*, March 7, 2018, available at: <https://timesofindia.indiatimes.com/city/kochi/25-industries-from-kerala-contributing-drdo-in-developing-indigenous-sonar/articleshow/63195920.cms> (Accessed on April 10, 2020).

capabilities are designed to deter rather than to be employed. Like nuclear weapons, the employment of Anti-Ship Ballistic Missiles even armed with conventional warheads would be seen as a highly escalatory action.

The situation in the SCS and in the South East Asian region is currently in a flux as alliances and partnerships are being rearranged and negotiated. China is keen to extend influence through economic means but countries such as Malaysia, Singapore, and Indonesia are wary of extra-regional influence including the presence of the US the Philippines and Thailand that had historically aligned with the US, on the other hand, have opened to Chinese investments and development programs. Ironically, Vietnam along with India is now being propped up by the US as regional competitors to China. The fact that India was not chided for the conduct of ASAT testing further exacerbates China's apprehensions as it faced almost universal backlash for the ASAT test it conducted in 2007. Such trends solidify China's threat perception that a regional alliance is shaping up against it.⁵⁴

For Russia on the other hand, a regional alliance to counter it was almost always present since the end of the Second World War. As Russia's economy has started improving, it has started to assert itself in Europe again. For European nations such as Germany and France, reliance on Russian hydrocarbons means that they would tread carefully. Russia has now also started to venture outside its traditional sphere of influence and has established a strong foothold in the Middle East. The reign of unchecked and unopposed US dominance in the Middle East is now being challenged not only by

⁵⁴"Military and Security Developments Involving the People's Republic of China 2018," Annual Report to Congress, *US Department of Defence*, August 16, 2018, available at: <https://media.defense.gov/2018/Aug/16/2001955282/-1/-1/1/2018-CHINA-MILITARY-POWER-REPORT.PDF> (Accessed on February 9, 2020).

Russia but by China as well.⁵⁵

India's pursuit of these capabilities would also have far-reaching dangerous consequences for strategic stability in South Asia. One implication of India's growing AUV capabilities can be a shift in ASW operations from defensive to offensive missions. By targeting submarines on patrol, AUVs can undermine the advantages of modern submarines in terms of high endurance, speed, and inherent stealth. If deployed in packs, AUVs can make it harder for submarines to escape detection. UUVs offer an attractive alternative to submarines in operating in the far-littoral waters. Enhanced capabilities in this field may provide India a safer option to significantly pursue adventurism in adversarial waters. Further, the chances of ambitious use of naval platforms and attribution may also increase. By integrating AUVs with submarine systems, the Indian Navy will have advanced capabilities to exert greater influence in the Indian Ocean. As Pakistan's sea-based nuclear program and its fleet of submarines grow, the greatest challenge posed to their operations will be posed by India's growing ASW capabilities. Membership of MTCR and Wassenaar Arrangement may help India access dual-use technologies and overcome the problem of lack of critical technologies in the development of combat unmanned vehicles. Enhanced seabed mapping may contribute to India's sea-based nuclear operations by helping Ballistic Missile Submarine (Ship, Submersible, Ballistic, Nuclear - SSBN) locate better hiding spots, thus making Pakistan's ASW operations more challenging. As Pakistan's naval nuclear leg matures, it should consider investing in force multipliers in the ASW domain.

Conclusion

All the three great powers are now locked in a spiraling arms race that is bound to further disturb the strategic stability. Developments

⁵⁵ Ibid.

such as BMDs, HGVs along with up-gradation of respective nuclear arsenals is underway as newer technologies such as Artificial Intelligence, directed energy weapons and cyber warfare become more prevalent. The development of these systems is taking place in an environment of increased political volatility where states are continuously vying to assert themselves in contested regions. The fact that the ideas of arms control and disarmament have suffered in recent times as the big powers try to develop newer capabilities before agreeing to any sort of limitations makes it likely that such capabilities will be part of the future of any conflict or escalation.

The three cases discussed in this paper differ from one another greatly due to their respective strategic problems, goals, and ambitions. The acquisition of A2/AD capabilities by each state is driven by varied motivations. Their possible use in conflict situation would be shaped by the prevailing regional scenarios. This research paper concludes that while China and Russia mostly use A2/AD capabilities in defensive roles to deter the US from engaging in their perceived areas of interest, India's pursuit of weapons that constitute A2/AD capabilities is driven by its ambitious designs. India's pursuit of strategic superiority over Pakistan has encouraged it to develop weapon systems like anti-satellite weapons, ballistic missile defence systems, and hypersonic delivery systems with greater precision strike capabilities to provide New Delhi a false confidence to control escalation dynamics. Along with increasingly worrying statements by the Indian political leadership, the acquisition of these systems raises serious concerns of conflict escalation from conventional to nuclear level in a region that already remains a nuclear flashpoint. Therefore, it is apparent that the introduction and proliferation of A2/AD strategies and capabilities would not only alter the strategic equation for these countries but also lead to greater vulnerabilities of their enemies and may lead to greater disturbances in strategic affairs.