

India's Evolving Space Militarization and the Security Implications for Pakistan

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Abstract

India's evolving militarization of space, marked by its growing military space capabilities and strategic investments, presents security challenges for Pakistan. As India's space power expands, including its development of anti-satellite weapons and defense-oriented space programs, the regional security dynamics shift, raising concerns over an arms race and strategic instability in South Asia. This paper employs the Security Dilemma Theory to analyze the impact of India's space advancements on South Asian regional stability. Using the qualitative research methodology, the research identifies India's development of anti-satellite weapons, defense-focused space programs, and global positioning as a major space power escalates the risk of an arms race, heightens strategic instability, and intensifies Pakistan's vulnerabilities. It also underlines the lack of crisis communication channels and robust confidence-building measures (CBMs) between the two countries, further amplifying the threat of inadvertent escalations. The findings suggest that Pakistan must adopt a proactive strategy to address these regional challenges. Collaborative efforts among regional stakeholders, participation in multilateral space forums, and adherence to international space law principles are essential for regional space security and stability in South Asia. This study underscores the importance of balancing national security interests with regional and global stability in the increasingly contested space domain.

Keywords: India, Pakistan, Space Militarization, Security, South Asia

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Introduction

States around the world are expanding their reach beyond the boundaries of space. They are adopting various pathways to reach outer space. In previous decade, the trend of space exploration witnessed an acceleration. The recent state efforts are not limited to scientific exploration, but they have importance in the domain of national security.

India has been making efforts in the domain of space for decades. It established Indian Space Research Organization (ISRO) in 1969. ISRO has been launching satellites for multiple purposes such as communication, weather prediction, remote sensing and scientific research.¹ ISRO's work is steadily expanding, and it is not just limited to launching satellites. It has successfully landed a rover on the south pole of the moon and also launched a mission to Mars in 2013.²

Space militarization can be defined as the utilization of space and space-associated technologies for purpose of military objectives. The militarization of space is going to have a significant impact on regional and global stability. Although India claims that its space program is for civilian purposes, the dual-use nature of space assets has implications for strategic stability. Moreover, India is also shifting its space capabilities from civilian use to military use. The development of satellite-based navigation systems like Navigation with Indian Constellation (NavIC) and reconnaissance satellites for surveillance are clear examples of this shift. India is also tested anti-satellite missile in 2019, which signifies shift from defensive to offensive space capabilities.³

The militarization of space introduces new complexities in diplomatic relations and arms control efforts. The lack of comprehensive international agreements regulating military activities in space exacerbates tensions and necessitates diplomatic engagements to mitigate risks of conflict escalation. Against this backdrop, India's militarization of space presents multifaceted security challenges for Pakistan, a neighboring South Asian country with a complex history of regional dynamics and security concerns. These challenges encompass strategic, technological, diplomatic, and deterrence-related aspects, shaping the security calculus of both nations and the broader regional security landscape. The dynamics of

¹ Dinshaw Misty, "India's Emerging Space Program," *Pacific Affairs* 71, no. 2 (1998): 151–74, <https://doi.org/10.2307/2760974>.

² "Mangalyaan, India's First Mars Mission," *The Planetary Society*, accessed July 13, 2024, <https://www.planetary.org/space-missions/mangalyaan>.

³ Balak Singh Verma, "Introducing NavIC 2.0: Leveraging India's Strategic Space Advantage," *Observer Research Foundation*, April 1, 2024, <https://www.orfonline.org/expert-speak/introducing-navic-2-0-leveraging-india-s-strategic-space-advantage>.

deterrence between India and Pakistan are evolving with advancements in space capabilities. Integrating space assets into military doctrines and strategies complicates deterrence calculations, influencing crisis stability and escalation dynamics.⁴

India's expanding space capabilities, including satellite-based surveillance and reconnaissance, directly affect Pakistan's national security. Efforts to develop indigenous space technologies, such as satellite launch vehicles and space-based communication systems, highlight its impact on defense capabilities. Pakistan faces serious challenges in mitigating such vulnerabilities, assessing its defense capabilities, and addressing the broader implications of India's space militarization within the regional security complex in South Asia. The enhanced monitoring and intelligence-gathering capabilities enabled by Indian satellites, therefore, raise concerns about strategic vulnerabilities and potential preemption scenarios for Pakistan. The existing literature has investigated the strategic implications of space militarization, focusing primarily on arms control, deterrence stability, and geopolitical rivalry.

Literature Review

The militarization of space has gained increasing attention and it is changing strategic balance within South Asia. Existing literature has highlighted India's emergence in the space technologies as a growing threat to regional stability. Many scholars have identified critical gaps in deterrence framework.

Ahmed Saeed Minhas, in his article "*Space Weapons: A Rapidly Evolving Threat to South Asian Strategic Balance*," explores the inevitability of space weaponization, focusing on India's space program and its implications for South Asia's deterrence stability. He argues that India's probable development of space weapons could undermine Pakistan's deterrence stability, intensifying the regional arms race.⁵ Muhammad Tehsin, in his article, "*Space Weaponization and Strategic Stability in South Asia*," expands on these concerns by examining the interplay between space militarization and mutual deterrence strategies in South Asia.⁶

Ahmad Saeed Minhas and Ghulam Qumber, in their research paper, "*Emerging Space Weapons Probability and Indian Quest for Great Power Status: Implications for South Asian Deterrence Stability*," contextualize India's space pursuits within its aspiration for great power

⁴ Mian Zahid Hussain and Raja Qaiser Ahmed, "Space Programs of India and Pakistan: Military and Strategic Installations in Outer Space and Precarious Regional Strategic Stability," *Space Policy* 47 (February 1, 2019): 63–75, <https://doi.org/10.1016/j.spacepol.2018.06.003>.

⁵ Ahmed Saeed Minhas, "Space Weapons: A Rapidly Evolving Threat to South Asian Strategic Balance," *Ndu Journal*, 2018, <https://ndujournal.ndu.edu.pk/site/article/view/174/129>.

⁶ Muhammad Tehsin, "Space Weaponization and Strategic Stability in South Asia," *Global Social Sciences Review*, V (I): 689-695, <https://www.gssrjournal.com/article/space-weaponization-and-strategic-stability-in-south-asia>.

status, analyzing how the nationalist government leverages its space capabilities to assert dominance.⁷ Munazza Khalid, in her research article “*India-US space cooperation: Implications for the South Asian strategic stability*,” focuses on the India-US space partnership, emphasizing its implications for South Asia’s strategic stability. She highlights the asymmetric impact of this partnership on regional dynamics, with Pakistan increasingly reliant on China for strategic parity.⁸

The reviewed literature underlines the destabilizing effects of India’s space militarization on South Asia’s strategic stability but leaves significant gaps in understanding Pakistan’s countermeasures and the broader implications for crisis management. This study seeks to bridge these gaps by analyzing Pakistan’s strategic responses, exploring collaborative opportunities with China, and examining the role of international regulatory frameworks. By addressing these gaps, the research contributes to a deeper understanding of space militarization’s impact on South Asia and offers policy recommendations to mitigate escalating tensions.

However, research gaps exist related to India’s expanding space militarization and its implications for Pakistan’s national security interests, specifically within the broader Indo-Pakistan security landscape. This gap in the literature underscores the need to investigate the implications of India’s evolving space capabilities on crisis stability, regional deterrence dynamics, and Pakistan’s strategic vulnerabilities.

Against this backdrop, this research addresses the following research questions: How does India’s space militarization impact Pakistan’s National Security? What are the implications of India’s evolving space militarization for deterrence stability and crisis escalation in South Asia? These questions are important for developing a nuanced understanding of the security challenges posed by India’s space program to Pakistan. Therefore, developing a rational link between India’s space militarization and its security implications for Pakistan necessitates investigating historical trajectories, strategic developments, and emerging technologies while situating these within the broader regional security and space governance debates.

⁷ Ahmed Saeed Minhas and Ghulam Qumber, “Emerging Space Weapons Probability and Indian Quest for Great Power Status: Implications for South Asian Deterrence Stability,” *Margalla Papers* 22 (2018), <https://ndujournal.ndu.edu.pk/site/article/view/174/129>.

⁸ Munazza Khalid, “India-US Space Cooperation: Implications for the South Asian Strategic Stability,” *Journal of Humanities, Social and Management Sciences (JHSMS)* 2, no. 2 (2021): 55–66, <https://ideapublishers.org/index.php/jhsms/article/view/475/226>.

Theoretical Framework

The security dilemma theory helps us understand the intensifying tensions between India and Pakistan regarding India's space militarization.⁹ The fundamental concept of the security dilemma is that the security measures one state takes to bolster its security, such as military enhancements or technology innovations, may invoke insecurity in the adversary states.¹⁰ This perceived threat compels the rival state to take defensive steps, resulting in an arms race and heightened instability, even when no state aimed for this result.

India's advancement of anti-satellite weapon systems is motivated by its intent to enhance security.¹¹ Pakistan perceives India's actions as aggressive, interpreting them as efforts to establish supremacy and secure a regional strategic advantage. Consequently, India's urge to militarize space makes Pakistan more vulnerable, prompting its own defensive actions. This interaction illustrates the security dilemma, where one state attempts to enhance its security unintentionally exacerbate the security apprehensions of another state.

A fundamental aspect of the security dilemma is the misperception of intentions. Pakistan views these advancements as an endeavor by India to alter the power balance in its favor, hence jeopardizing Pakistan's security. Consequently, Pakistan may feel obligated to enhance its space and military capabilities to offset India's perceived superiority. This cycle of action and reaction engenders an increasing arms race despite both countries operating from defensive motivations.

The security dilemma starts from conventional military rivalry but also encompasses emerging domains, like space as well.¹² India's militarization of space creates a novel domain of geopolitical rivalry between the two nations, complicating an already tense security landscape. As both states try to strengthen their positions on this new frontier, their competition moves from traditional military settings to space, making the region even less stable.

External forces also affect this concept. Pakistan is more concerned about India's relationships, especially with the US. Pakistan sees India's militarization of space as part of a larger strategic shift that threatens its security and throws off the balance of power in the region.

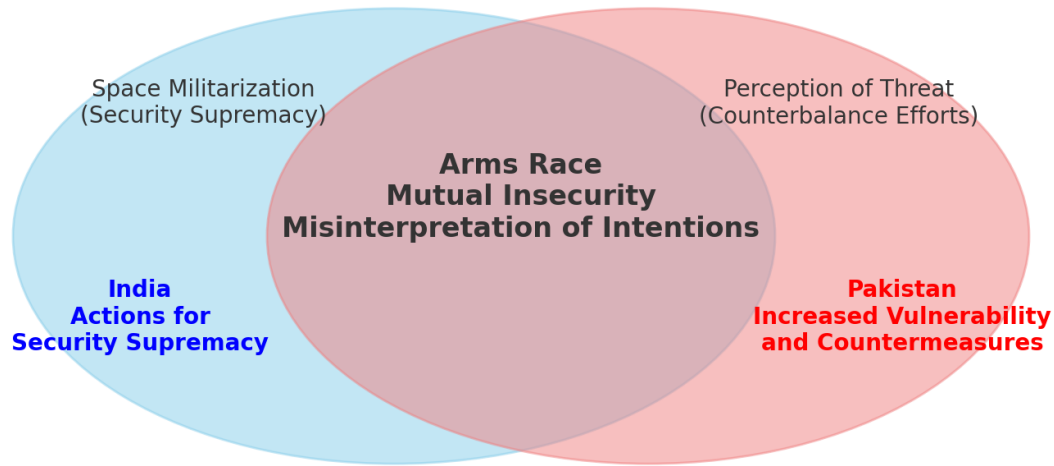
⁹ Shiping Tang, "The Security Dilemma: A Conceptual Analysis," *A Theory of Security Strategy for Our Time*, by Shiping Tang (New York: Palgrave Macmillan US, 2010), 33–71, https://doi.org/10.1057/9780230106048_3.

¹⁰ Ibid.

¹¹ Dimitrios Strokos, "Still Lost in Space? Understanding China and India's Anti-Satellite Tests through an Eclectic Approach," *Astropolitics* 21, no. 2–3 (September 2, 2023): 179–205, <https://doi.org/10.1080/14777622.2023.2277253>.

¹² Jeremy Grunert, "Outer Space Policy and the 'Security Dilemma': Is America Destined for Space Conflict?," *The United States Space Force and the Future of American Space Policy* (Brill Nijhoff, 2022), 165–240, <https://brill.com/downloadpdf/book/9789004524064/BP000005.pdf>.

The involvement of external forces enhances the security dilemma and makes it harder for India and Pakistan to lower their tensions. Thus, India's efforts to enhance its space militarization create a cycle of increased fear and tension with Pakistan. This shows how bad the security dilemma is and how important it is to discuss it and build trust to stop further destabilization.



Made by the Authors

Historical Context of Space Militarization by India

India's space exploration and technological advancement are marked by a series of milestones and strategic decisions that have shaped its current standing as a significant space-faring nation. The roots of India's space program can be traced back to the 1960s when Dr. Vikram Sarabhai laid the foundation for space research and development.¹³ In 1962, the establishment of the Indian National Committee for Space Research (INCOSPAR) paved the way for the formation of the ISRO in 1969.¹⁴

During its early years, ISRO focused on developing indigenous satellite technology, starting with the Aryabhata satellite launched in 1975. Subsequent missions, such as Rohini and Apple satellites, showcased India's capabilities in space technology and laid the groundwork for more advanced endeavors. One of the significant contributions of Indian space program has been in space applications, particularly in communication and remote sensing.¹⁵ The launch of the Indian National Satellite System (INSAT) in the 1980s revolutionized

¹³ Biswanath Gupta and Kd Raju, "Space Exploration by India and Socio-Economic Cooperation with SAARC Countries," *India Quarterly* 72, no. 3 (2016): 278–89, <https://www.jstor.org/stable/48505507>.

¹⁴ "Indian Space Research Organisation," accessed July 15, 2024, <https://www.isro.gov.in/genesis.html>.

¹⁵ *Ibid.*

telecommunications, broadcasting, and meteorology, benefiting various sectors of the economy and society.¹⁶

Indian space program also expanded its horizons through international collaborations and achievements. Collaborative ventures such as the Indo-French Megha-Tropiques satellite and participation in global space forums provided significant support to the Indian space program.¹⁷

The convergence of space technology with defense requirements led to integrating space assets into India's national security framework. Indian space doctrine has evolved to encompass both civilian and military aspects, reflecting a dual-use approach to space technology. Articulating space policy frameworks and guidelines for space activities and establishing dedicated military space units highlight India's strategic focus on leveraging space for national security interests. The strategic imperatives driving India's foray into military space capabilities are multifaceted. Key factors include the need for enhanced surveillance, intelligence gathering, communication resilience, and navigation precision in support of defense and security objectives. Security concerns arising from regional threats and geopolitical dynamics have also influenced the Indian space strategy.¹⁸

Developing advanced space technologies, including satellite imaging, remote sensing, and satellite-based navigation systems like NavIC, positioned India as a significant player in space. The demonstration of ASAT capabilities during Mission Shakti in 2019 marked a destabilizing move, highlighting India's ability to target and potentially disrupt critical space assets.¹⁹

India's progression in space militarization has not occurred in isolation but has reverberated across the regional and global security landscape, influencing strategic perceptions, alliances, and arms dynamics. In the context of South Asia, India's space militarization has added a new dimension to the regional security paradigm. It has prompted neighboring countries like Pakistan to reassess their security postures, develop

¹⁶ Ashok Raj and C. Vishnu Mohan, "INSAT: Evolution and Prospects," *Economic and Political Weekly* 17, no. 33 (1982): 1326–31, <https://www.jstor.org/stable/4371240>.

¹⁷ Thierry L. Trémas et al., "ScaRaB: First Results of the Scanner for Radiative Budget on Board the Indo-French Satellite Megha-Tropiques," in *Earth Observing Systems XVII*, vol. 8510 (SPIE, 2012), 13–27, <https://www.spiedigitallibrary.org/conference-proceedings-of-spie/8510/851002/ScaRaB--first-results-of-the-scanner-for-radiative-budget/10.1117/12.928293.short>.

¹⁸ Rajeswari Pillai Rajagopalan and Dimitrios Strokos, "The Transformation of India's Space Policy: From Space for Development to the Pursuit of Security and Prestige," *Space Policy*, May 14, 2024, 101633, <https://doi.org/10.1016/j.spacepol.2024.101633>.

¹⁹ "Mission Shakti: Turning Point in India's Space Defence Technology," *Employment News*, April 20, 2024, <https://www.employmentnews.gov.in/newemp/MoreContentNew.aspx?n=SpecialContent&k=110627>.

countermeasures, and engage in strategic balancing to address perceived threats from space-based capabilities.²⁰

Indian Military Space Capabilities

Indian military space capabilities have significantly impacted its defense posture and strategic capabilities. The multifaceted nature of these capabilities, ranging from satellites and launch vehicles to strategic doctrines and partnerships, underscores their importance in national security planning, regional dynamics, and global space governance frameworks. Understanding the nuances of India's military space capabilities is crucial for assessing their impact on security paradigms, fostering cooperation, and managing potential risks in the increasingly contested domain of space.

NASA-ISRO Synthetic Aperture Radar (NISAR)

In partnership with NASA, ISRO plans to deploy the SAR satellite utilizing the GSLV-Mk II by 2025.²¹ This initiative continues India's radar imaging program, which commenced with the launch of RISAT-2 in April 2009.²² The RISAT-2 program, which resembles Israel's TecSAR satellite, was conceived to meet India's border security needs.

▪ **GSAT-6**

With a mass of 2117 kilograms, GSAT-6 represents the second satellite specifically designed to meet the requirements of the Indian military, facilitating communication for personnel through satellite terminals instead of conventional portable V/UHF radios, thereby enhancing operational capabilities across diverse terrains such as maritime zones, coastal areas, forests, deserts, rivers, and snow-laden mountains.²³ The satellite provides command centers with immediate communication and enhanced situational awareness. GSAT-6 represents the 25th geostationary communication satellite developed by ISRO and is the sixth installment in the GSAT series. The satellite facilitates S-band communications via five spot beams, employing a 6-meter-wide

²⁰ "Speakers Renew Calls for Treaty to Prevent Arms Race in Space as First, Fourth Committees Convene Joint Meeting | Meetings Coverage and Press Releases," *United Nations*, October 27, 2022, <https://press.un.org/en/2022/gaspd761.doc.htm>.

²¹ "A.27 NASA-ISRO Synthetic Aperture Radar Mission (NISAR) Research and Applications Science Team: Not Solicited in ROSES-2024," *NASA Solicitation and Proposal Integrated Review and Evaluation System*, February 14, 2024, <https://nspires.nasaprs.com/external/solicitations/summary.do?solId=%7b26099298-ACCA-00C5-3B87-3C358CD396C6%7d&path=&method=init>.

²² "RISAT-2 (Radar Imaging Satellite-2)," *eoPortal*, August 9, 2023, <https://www.eoportal.org/satellite-missions/risat-2#eop-quick-facts-section>.

²³ Rajeswari Pillai Rajagopalan, "What Does India's Satellite Trouble Mean for Its Space Ambitions?," *The Diplomat*, April 4, 2018, <https://thediplomat.com/2018/04/what-does-indias-satellite-trouble-mean-for-its-space-ambitions/>.

antenna, encompassing India for user links, and C-band communication through a singular beam.

▪ ***GSAT-7A***

Initiated on December 19, 2018, GSAT-7A represents the 35th communication satellite engineered by ISRO. The objective is to equip the Indian Air Force (IAF) with advanced Ku-band communication capabilities. The satellite, featuring a chemical propulsion system, is designed to operate for at least eight years.²⁴ GSAT-7A was designed to unify ground radar stations, UAVs, airbases, and AWACS systems within the IAF, enhancing its network-centric warfare capabilities and promoting intelligence-sharing across various platforms. Referred to as the 'Indian Angry Bird,' GSAT-7A, GSAT-7, and GSAT-6 constitute an essential communication network for the military forces of India.

▪ ***Rukmani Satellite***

In a noteworthy advancement in 2013, the Indian Navy distinguished itself as the inaugural branch of the nation's defense forces to utilize a specialized communication satellite known as the Rukmani Satellite. This launch revolutionized the communication methods employed by naval vessels, aircraft, and terrestrial forces over extensive distances. Implementing secure, encrypted real-time satellite communication has significantly enhanced intelligence-sharing capacity, bolstered tactical awareness, and facilitated superior command and control across extensive operational domains. The Rukmani, or GSAT-7 (also referred to as INSAT 4F), is a military communications satellite with a mass of 2650 kilograms. The total expenditure amounted to roughly Rs 180 crore, while the costs associated with launch services from international suppliers reached approximately Rs 480 crore. The satellite significantly enhanced communication and surveillance across both the eastern and western sectors of the Indian Ocean, covering approximately 2000 nautical miles. The implementation of this system allowed the Indian Navy to transcend reliance on conventional V/UHF/HF communication methods, which were vulnerable to jamming, hacking, and interference, as well as constrained by range limitations. Historically, naval vessels depended on Commercial INMARSAT terminals, commonly utilized by merchant ships, which were both costly and offered diminished security. These systems presented considerable dangers throughout the conflict by endangering communications and

²⁴ "GSAT-7A: A Military Communications Satellite Developed by ISRO for IAF," *Airforce Technology* (blog), January 9, 2019, <https://www.airforce-technology.com/projects/gsat-7a/>.

naval positioning. INMARSAT, under the management of British Satellite Telecommunications Ltd, offers mobile satellite communications services worldwide.²⁵

▪ ***RISAT Satellite***

In May 2019, India initiated the deployment of the RISAT-2B, an Earth observation satellite designed to augment reconnaissance capabilities. This satellite was launched after the RISAT-2, which played a vital role in the surveillance. RISAT-2B is equipped with an X-band synthetic aperture radar, enabling it to capture high-resolution images continuously, regardless of the time of day or prevailing weather conditions.²⁶ The satellite, equipped with sensors from Israel Aerospace Industries, is engineered for a mission duration of five years. ISRO intends to deploy four more satellites of this type, with the imagery obtained from the RISAT-2B proving crucial during India's surgical strikes in 2016 and the Balakot airstrike in February 2019.

▪ ***Integrated Space Cell***

The Department of Space, ISRO, and the three branches of the military forces came together to develop the Integrated Space Cell in response to mounting threats to India's space-based infrastructure. This organization combines military and space missions to protect India's space resources.²⁷ After China successfully demonstrated an anti-satellite missile in 2010, which destroyed one of its outdated weather satellites, the necessity for such an agency became even more apparent.

▪ ***CARTOSAT Satellites***

The recent CARTOSAT-3 satellite signifies a notable progression in satellite imaging technology, boasting a resolution of up to 20 centimeters, facilitating intricate imaging of military assets, including bunkers and weapon systems.²⁸ Earlier models, such as CARTOSAT-2, 2A, and 2B, offered a resolution reaching 0.5 meters. The satellites are outfitted with panchromatic (PAN) cameras, capable of capturing high-resolution stereoscopic black-and-white images of the Earth's surface within the visible spectrum, fulfilling purposes for both military and civilian sectors.

²⁵ "What Is GSAT-7 Rukmini?," *The Indian Express* (blog), July 5, 2017, <https://indianexpress.com/article/what-is/india-rukmini-gsat-7-satellite-china-indian-ocean-region-sikkim-standoff-4736318/>.

²⁶ Hanneke Weitering, "India Successfully Launches RISAT-2B Earth-Observation Satellite," *Space.com*, May 22, 2019, <https://www.space.com/india-risat-2b-earth-satellite-launch-success.html>.

²⁷ Namrata Goswami, "India's Space Program, Ambitions, and Activities," *Asia Policy* 15, no. 2 (2020): 43–49, <https://www.jstor.org/stable/27023898>.

²⁸ "Cartosat 3," *National Aeronautics and Space Administration*, July 15, 2024, 3, <https://nssdc.gsfc.nasa.gov/nmc/spacecraft/display.action?id=2019-081A>.

- ***EMISAT***

ISRO successfully launched the electronic intelligence satellite EMISAT in April 2019 into a 749-kilometer orbit around the planet. EMISAT is a space-based electronic intelligence (ELINT) system developed in an ISRO-DRDO collaboration.²⁹ The satellite aims to locate adversary radar stations precisely by identifying and detecting the electromagnetic emissions from those installations. The Indian military forces now have far better situational awareness because of EMISAT.

- ***Gisat Series Satellites***

Compared to previous imaging technologies that could only scan a particular area every 22 days. The Indian Army can now survey and map territories after two days with the Gisat satellites. Gisat provides almost real-time photos of vast areas when there are no clouds. With a geo-imager that can capture images at many wavelengths and resolutions between 50 and 1.5 kilometers, the satellite significantly improves India's capacity to map its territory for both military and non-military uses.³⁰

- ***Mission Shakti***

As part of "Mission Shakti," Prime Minister Narendra Modi announced on March 27, 2019, that an anti-satellite missile test had been completed. The low-Earth orbit target satellite, Microsat-R, was destroyed in this test, demonstrating India's accuracy in missile guidance and maneuvering technology. With this test, India advanced its space defense plans to a new level and became the fourth nation, after the US, Russia, and China, to acquire anti-satellite capabilities.³¹

- ***Hyperspectral Imaging Satellite (HySIS)***

An important step forward in Earth observation technology was taken on November 29, 2018, when the HySIS was successfully launched. Starting from 630 kilometers above the Earth's surface, the satellite can observe 55 different spectral bands.³² The Space Applications Centre of the ISRO in Ahmedabad was responsible for developing its

²⁹ "EMISAT Can Bolster India's Surgical Strike Capability," *The Economic Times*, April 1, 2019, <https://economictimes.indiatimes.com/news/defence/emisat-can-bolster-indias-surgical-strike-capability/articleshow/68670153.cms?from=mdr>.

³⁰ "GISAT 1, 2 (EOS 03, 05)," *Gunter's Space Page*, accessed July 15, 2024, https://space.skyrocket.de/doc_sdat/gisat-1.htm.

³¹ "India Shoots down Satellite, Joining Space 'Super League': Modi," *Al Jazeera*, March 27, 2019, <https://www.aljazeera.com/news/2019/3/27/india-shoots-down-satellite-joining-space-super-league-modi>.

³² "ISRO's HySIS Satellite Sends First Image Covering Parts of Lakhpat Area in Gujarat," *India Today*, December 3, 2018, <https://www.indiatoday.in/india/story/isro-s-hysis-satellite-sends-first-image-covering-parts-of-lakhpat-area-in-gujarat-1401733-2018-12-03>.

imaging system. On the other hand, the Semi-Conductor Laboratory in Chandigarh was responsible for fabricating its optical imaging chip. HySIS was developed for a wide range of applications, including environmental monitoring, agriculture, forestry, and the evaluation of coastal zones, soils, and inland water resources, in addition to military surveillance.

▪ ***IndSpaceEx***

India had its first joint military space exercise, known as IndSpaceEx, in July 2019, and the DRDO was a key player in determining how equipped India was to counter threats from space. In order to find weaknesses in India's space defense capabilities, this exercise assessed both offensive and defensive tactics, such as directed energy systems and anti-satellite missiles. Following Mission Shakti, IndSpaceEx seeks to fortify India's military tactics in space combat and advance the development of a cohesive doctrine for space-based wars.³³

Regional Implications of India's Space Militarization

The militarization of space by India carries significant consequences for the security framework of South Asia, a region characterized by enduring rivalries, territorial conflicts, and a precarious equilibrium of power. As India enhances its space capabilities for military applications, it presents new challenges and risks that may disrupt the region's security dynamics. The militarization of space serves to augment India's power projection capabilities while simultaneously intensifying existing security dilemmas, thereby catalyzing an arms race and escalating tensions with its neighboring states, notably Pakistan and China. This section examines the implications of India's space militarization on the regional equilibrium of power, the potential for heightened conflict escalation, and the complexities it introduces to crisis management endeavors in South Asia.

▪ ***Disruption of Strategic Balance in South Asia***

India's militarization of space has altered South Asia's geopolitical dynamics. This section analyzes how these trends exacerbate regional instability and complicate the security landscape for Pakistan.

³³ Shahid Hussain and Khurram Shahzad, "India's Quest for 'Global Space and Influence' through the 'Outer Space' Domain," *Journal of Space Safety Engineering* 10, no. 3 (2023): 351–65, <https://www.sciencedirect.com/science/article/pii/S2468896723000605>.

1. The shift in Power Projection and Military Superiority

One of the fundamental ways in which India's militarization of space alters the regional security dynamics, is through its augmented capacity to project power. India enhances its intelligence, surveillance, reconnaissance (ISR), and communication capabilities by integrating space-based assets into its military operations. This technological advantage provides India with enhanced situational awareness, precise targeting capabilities, and immediate access to battlefield information, all of which may prove vital in times of conflict.³⁴

India's space-enhanced military dominance poses a significant challenge for Pakistan. In light of the disparities in traditional military strengths between the two countries, Pakistan views India's progress in space technology as a strategic move to reinforce its supremacy in South Asia. Incorporating space-based intelligence and early warning systems into India's military doctrine would enable precise surveillance of Pakistan's troop movements, missile deployments, and strategic assets. This compromises Pakistan's strategic deterrence, necessitating Islamabad to pursue countermeasures, such as an increased dependence on nuclear deterrence or advancing its military space capabilities.³⁵

The alteration of the strategic equilibrium brought about by India's military space capabilities introduces an additional dimension of uncertainty in South Asia. In light of potential vulnerabilities to preemptive actions or surveillance, Pakistan might be compelled to embrace a more assertive defense strategy, thereby elevating the likelihood of miscalculations or unintended escalations amid intensified tension.³⁶ India's increasing power projection through space achievements destabilizes the strategic balance in the region, compelling Pakistan to change its military strategies in ways that might elevate the risk of escalation.

2. Impact on Conventional and Nuclear Deterrence

The space militarization by India has significant implications for the dynamics of conventional and nuclear deterrence in South Asia. This section looks into how

³⁴ Raja Qaiser Ahmed, Misbah Arif, and Mahvish Malik, "Emerging Trends of Space Weaponization: India's Quest for Space Weapons and Implications for Security in South Asia," *Astropolitics* 18, no. 2 (May 3, 2020): 158–69, <https://doi.org/10.1080/14777622.2020.1788902>.

³⁵ Fazal Abbas Awan and Prof Dr Umbreen Javaid, "Space Militarization Race among China-Russia and USA: Implications for South Asia," *South Asian Studies* 1, no. 35 (2021), <https://journals.pu.edu.pk/journals/index.php/IJSAS/article/view/4106>.

³⁶ Summar Iqbal Babar and Abu Hurairah Abbasi, "Emerging Technologies and the Threat to South Asian Security," *CISS Insight Journal* 11, no. 2 (2023): P40-59, <http://journal.ciss.org.pk/index.php/ciss-insight/article/view/317>.

improvements in space-based capabilities challenge Pakistan's nuclear posture and introduce instability into an already fragile deterrence framework.

The militarization of space by India carries significant consequences for the dynamics of nuclear deterrence in South Asia. The nuclear arsenals of India and Pakistan are maintained with a keen awareness of how mutual perceptions of deterrence stability significantly shape their strategic postures. The advancements made by India in space-based ISR, missile defense systems, and ASAT capabilities pose a significant challenge to Pakistan's second-strike capability, which is fundamental to the framework of nuclear deterrence.³⁷

Indian ASAT tests, exemplified by Mission Shakti in 2019, showcased its ability to incapacitate adversarial satellites in low-earth orbit. The capacity to disrupt or obliterate satellites that are essential to Pakistan's nuclear command and control frameworks may undermine Pakistan's assurance in its retaliatory capabilities.³⁸ This subsequently heightens the potential for an arms race in counter-space technologies, as Pakistan may expedite advancing its ASAT or missile defense systems to reestablish strategic equilibrium. Such developments would exacerbate regional tensions and complicate endeavors to uphold arms control in South Asia.

Moreover, India's missile defense systems, possibly augmented by space-based capabilities, have the potential to undermine Pakistan's deterrence strategy by incapacitating its nuclear delivery mechanisms. In light of the circumstances, Pakistan might find it necessary to augment its nuclear capabilities or implement more precarious deployment tactics, including elevating the alert status of its nuclear warheads or situating them in more concealed and varied locations.³⁹ The interplay of these dynamics amplifies the potential for nuclear brinkmanship, thereby fostering an environment of increased instability in South Asia. This has placed severe challenges to conventional and nuclear deterrence in the region, compelling Pakistan into a precarious position where strategic stability is increasingly difficult to maintain.

³⁷ Aruna Kammila, "Militarisation & Weaponisation of Space: Where Does India Stand?," *Issue 6 Int'l J.L Mgmt. & Human.* 3 (2020): 13, https://heinonline.org/hol-cgi-bin/get_pdf.cgi?handle=hein.journals/ijlmhs8§ion=6.

³⁸ Hussain and Ahmed, "Space Programs of India and Pakistan."

³⁹ Dennis M. Rice and USSF Major, "Deterrence and Space Strategy," *Air University Press*, accessed July 15, 2024, https://www.airuniversity.af.edu/Portals/10/AUPress/Papers/SP_02_Rice_Deterrence_and_Space_Strategy.pdf.

▪ ***Complications in Crisis Management and Escalation Control***

Given India's evolving space capabilities, South Asia faces new complexities in managing and controlling the escalation of a crisis. It elaborates on the challenge to crisis stability and the increased risk of misperception and unintended escalation of conflict.

1. Challenges to Crisis Stability

Theoretically, the implications of satellite developments crisis stability can go both ways. Increasing transparency can enhance trust between India and Pakistan. The capacity to observe troop movements, missile deployments, and other strategic assets in real-time could increase trust between India and Pakistan. In crisis situation, this transparency might help in reducing the tension between both states.⁴⁰ However, there is technological disparity between both states. Furthermore, India is developing precision missiles, and there is uncertainty in its No-First-Use Policy. This might increase security dilemma for Pakistan because India can use data gathered using satellites to have better situational awareness. With help of precision missile, it can carry out counterforce strikes.⁴¹ Therefore, the advancements in India's space capabilities introduce complexities to managing crises and controlling escalation within the South Asian region. During increased tension, space-based ISR systems offer immediate intelligence and surveillance, improving early warning capabilities while simultaneously elevating the risks of misperception and miscalculation.⁴²

Furthermore, the existence of anti-satellite capabilities of India contribute to a heightened level of instability during crises. In a scenario characterized by conflict, the allure of incapacitating or annihilating an opponent's satellites—be it for intelligence, surveillance, reconnaissance, communication, or missile detection—can potentially escalate tensions into a full-blown confrontation. Indian ability to target Pakistan's space capabilities might further complicate crisis stability.

Space as a New Domain of Warfare

The militarization of space introduces a novel arena for conflict, characterized by the inadequacy of established rules of engagement and the nascent state of international norms. In South Asia, the existing tensions within conventional and nuclear realms are already laden with peril; the introduction of space as a prospective theater of conflict further complicates the

⁴⁰ Zohaib Altaf and Nimrah Javed, "The Triad of Technology and Its Implications for Strategic Stability in South Asia," *South Asian Voices*, May 2, 2024, <https://southasianvoices.org/sec-c-pk-r-triad-of-technology-05-02-2024/>.

⁴¹ Ibid.

⁴² Ahmed Saeed Minhas, "Space Weapons: A Rapidly Evolving Threat to South Asian Strategic Balance," *Ndu Journal*, 2018, <https://ndujournal.ndu.edu.pk/site/article/view/174/129>.

endeavor to uphold strategic stability.⁴³ The lack of definitive regulations surrounding the military utilization of space heightens the potential for unintended escalations, thereby complicating the processes of conflict resolution and de-escalation.

India's development of ASAT weaponry, as displayed by its March 2019 "Mission Shakti" test, is one example of the increasing militarization of space.⁴⁴ The test demonstrated India's growing space warfare capabilities by successfully intercepting and destroying one of its low-Earth orbit satellites. India's demonstration of ASAT capabilities sparked intense domestic and international reactions due to concerns over its potential to disrupt regional stability and trigger an arms race. Pakistan, viewing this development as a direct threat to its security, called for international attention and measures to address the emerging risks.⁴⁵

Moreover, the absence of well-defined communication pathways for incidents about space, such as unintended satellite collisions or disruptions to space-based assets, intensifies the potential for misinterpretation during critical situations. As the realm of space increasingly transforms into a contested arena, the imperative for regional confidence-building initiatives and discourse surrounding space security intensifies. This is essential to avert the potential militarization of space from exacerbating terrestrial conflicts.⁴⁶

The militarization of space by India presents a considerable challenge to the security dynamics of South Asia. India has disturbed the strategic balance in the region with its space technology achievements, including its ASAT capabilities and improvements in space-based reconnaissance, surveillance, and communication systems. For example, India's RISAT satellite series significantly tips the scales in its favor by improving its military's capacity to undertake reconnaissance and surveillance in all weather conditions.⁴⁷ These events increase the likelihood of conflict in the area and worsen already-existing tensions.

Pakistan is likely to adopt policy solutions in response to Indian space developments, such as nuclear modernization, the creation of space-based technologies, or strategic alliances with China, which has also shown notable progress in space capabilities due to increased

⁴³ Zulfqar Khan and Ahmad Khan, "Space Security Trilemma in South Asia," *Astropolitics* 17, no. 1 (January 2, 2019): 4–22, <https://doi.org/10.1080/14777622.2019.1578931>.

⁴⁴ "Mission Shakti," *Defense Research and Development Organization*, accessed July 2, 2024, <https://www.drdo.gov.in/drdo/mission-shakti>.

⁴⁵ "Mission Shakti: Pakistan Urges World to Slam India, China Calls for Peace," *India Today*, March 27, 2019, <https://www.indiatoday.in/world/story/mission-shakti-anti-satellite-missile-pakistan-china-1487866-2019-03-27>.

⁴⁶ Misbah Arif, "Strategic Landscape of South Asia and Prevention of Arms Race in Outer Space," *Astropolitics* 17, no. 1 (January 2, 2019): 51–61, <https://doi.org/10.1080/14777622.2019.1578934>.

⁴⁷ "What Is ISRO's RISAT Satellite Series?," *The Indian Express* (blog), May 13, 2019, <https://indianexpress.com/article/what-is/isro-radar-imaging-satellite-risat-series-pslv-5724063/>.

susceptibility to India's enhanced military capabilities.⁴⁸ One instance of Pakistan's efforts to offset India's technological superiority is its partnership with China on the Pakistan Remote Sensing Satellite (PRSS-1).⁴⁹

Security Implications for Pakistan

Pakistan, as a neighboring country to India, is intricately linked to the security dynamics shaped by Indian space militarization efforts. Indian development of advanced space capabilities has significant implications for Pakistan's national security, strategic calculations, and defense posture. This section explores the multifaceted security implications for Pakistan, focusing on strategic vulnerabilities, technological competition, diplomatic responses, and future mitigation strategies.

A. Strategic Vulnerabilities and Threat Perceptions

For Pakistan's national security, the developments in Indian space technologies present multiple challenges. These include weaknesses induced by India's enhanced communication, navigation, and satellite spying capabilities. This section elaborates on specific places that seriously challenge Pakistan's security environment.

- ***Satellite Surveillance and Reconnaissance***

India's space-based surveillance and reconnaissance capabilities significantly challenge Pakistan's national security. The ability to monitor border areas, track military movements, and gather real-time intelligence through satellite imagery gives India an upper hand in situational awareness and threat assessment. This enhanced surveillance capability raises concerns for Pakistan regarding strategic vulnerabilities, preemptive strikes, and asymmetrical advantages in potential conflicts.⁵⁰ The deployment of high-resolution imaging satellites, such as the Cartosat series, allows India to closely monitor sensitive areas, military installations, and infrastructure developments along the India-Pakistan border. This not only aids in border security but also enhances India's ability to gather intelligence on Pakistan's military activities, deployments, and strategic capabilities.

⁴⁸ Abu Hurairah Abbasi and Saher Liaqat, "Energy Diplomacy in Practice: China's Role as a Global Energy Leader," *Pakistan Journal of Integrated Social Sciences (PJISS)*, June 23, 2024, <https://journals.uol.edu.pk/PJISS/article/view/3594>.

⁴⁹ "Pakistan Remote Sensing Satellite (PRSS-1)," *SUPARCO*, accessed July 2, 2024, <https://suparco.gov.pk/major-programmes/projects/prss-1/>.

⁵⁰ Akash Shah, "Deterrence Under Surveillance: Indian Space-Based ISR Capabilities and Pakistan's Nuclear Deterrence," *Journal of Security & Strategic Analyses* 8, no. 2 (2022): 07–26.

- ***Communication Interception and Jamming***

India's utilization of satellite communication for military purposes enables secure and reliable command, control, and communication networks. However, these communication channels' potential interception, jamming, or disruption poses a significant challenge to Pakistan's information security and operational capabilities. India's space-based communication systems could be targeted or manipulated in a conflict or crisis, impacting Pakistan's ability to maintain operational secrecy, command hierarchy, and coordinated responses.⁵¹ Pakistan needs to invest in resilient and secure communication infrastructure, including encryption technologies, frequency-hopping techniques, and backup systems, to mitigate the risks of communication disruptions or cyberattacks targeting space-based assets.

- ***Navigation and Targeting Capabilities***

India's deployment of navigation satellites, such as NavIC, enhances its military's precision navigation and targeting capabilities. This poses challenges for Pakistan regarding countering accurate targeting, navigational support for military operations, and potential encirclement scenarios facilitated by space-based assets.⁵² Integrating NavIC with India's missile defense systems, aerial platforms, and maritime operations enhances India's overall operational effectiveness and strategic deterrence posture. Pakistan must enhance its navigation and targeting capabilities, invest in robust anti-jamming technologies, and develop alternative navigation systems to reduce dependency on foreign navigation aids and mitigate the risks of India's space-based assets. Thus, India's space advancements amplify Pakistan's strategic vulnerabilities by enhancing its intelligence, communication, and targeting capabilities. Resilient technological solutions and strategic countermeasures are necessary to address these challenges.

B. Technological Competition and Arms Race Dynamics

South Asia has witnessed a technological race due to India's fast-paced advancements in space militarization. This section explains how Pakistan is forced to react to India's moves by increasing its space capabilities to sustain strategic parity.

⁵¹ Amjad Mahmood and Adil Sultan, "Impact of India's ISR Capabilities on South Asian Security Dynamics," *Strategic Studies* 41, no. 4 (2021): 17–39, https://strategicstudies.org.pk/index.php/strategic_studies/article/view/40/4.

⁵² Abeer Iftikhar Tahirkheli, "India's Strategic Force Modernization and Its Implications on Strategic Environment of Pakistan," *Strategic Thought* 4, no. 1 (2022): 155–71, <https://strategicthought.ndu.edu.pk/site/article/view/83>.

- ***Race for Space Dominance***

India's advancements in space technology and militarization contribute to a regional race for space dominance and technological superiority. Pursuing space-based assets, anti-satellite capabilities, and space-based weapon systems fosters an arms race dynamic beyond conventional military domains. Pakistan faces pressure to match India's space capabilities, develop countermeasures, and invest in indigenous space technologies to maintain strategic parity and deterrence stability.⁵³ The escalation of space-related capabilities, including space-based ISR, satellite communication, and navigation systems, underscores the need for Pakistan to prioritize its space program, enhance space situational awareness, and develop response strategies to address emerging space threats.

- ***Deterrence and Strategic Stability***

India's space militarization efforts influence South Asia's deterrence dynamics and strategic stability. Integrating space assets into military doctrines, contingency planning, and crisis management strategies enhances India's deterrence posture and operational capabilities across multiple domains. Pakistan's national security calculus must account for space-enabled threats, space-based missile defense systems, and space warfare strategies that could alter the dynamics of conflict escalation and crisis stability.⁵⁴ Maintaining strategic stability in space requires dialogue, transparency, crisis communication channels, and Confidence Building Measures (CBMs) Pakistan and India. Bilateral agreements, arms control initiatives, and space-related CBMs can reduce the risks of space-related conflicts and promote mutual understanding in responsibly managing space assets.

C. Diplomatic and Policy Responses

Diplomacy would be paramount in addressing the threats of Indian space militarization. Pakistan's diplomatic and policy tools for maintaining regional stability with peaceful space activities are laid out in this section.

- ***Diplomatic Engagement and CBMs***

Pakistan engages in diplomatic initiatives to address space-related security concerns, promote transparency, and advocate for arms control measures in space governance forums. Efforts to enhance dialogue, communication channels, and crisis management mechanisms contribute to

⁵³ Amjad Mahmood and Adil Sultan, "Impact of India's ISR Capabilities on South Asian Security Dynamics," *Strategic Studies* 41, no. 4 (2021): 17–39, https://strategicstudies.org.pk/index.php/strategic_studies/article/view/40/4.

⁵⁴ Summar Iqbal Babar and Abu Hurrairah Abbasi, "Emerging Technologies and the Threat to South Asian Security," *CISS Insight Journal* 11, no. 2 (2023): P40-59, <http://journal.ciss.org.pk/index.php/ciss-insight/article/view/317>.

regional stability and conflict prevention.⁵⁵ Engagement in multilateral forums such as the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS), Conference on Disarmament (CD), and regional space cooperation organizations provides avenues for discussing space security, space debris mitigation, and peaceful uses of outer space. Pakistan's active participation in diplomatic initiatives underscores its commitment to responsible space behaviors, peaceful coexistence, and international cooperation in space activities.

- ***Space Policy and Capability Development***

Pakistan's space policy formulation and capability development strategies are guided by its national security imperatives, technological ambitions, and strategic interests. Investments in satellite technology, launch capabilities, space situational awareness, and space-based applications for civilian and military purposes reflect Pakistan's evolving space program and security considerations.⁵⁶ Collaboration with international partners, including China, Russia, and Europe, in space technology transfer, satellite development, and space research enhances Pakistan's space capabilities and strategic autonomy. Developing indigenous space technologies, fostering innovation, and strengthening regulatory frameworks contribute to Pakistan's space resilience and competitiveness in the evolving space domain. Pakistan's diplomatic engagement and policy framework are necessary for countering the destabilizing impact of Indian space militarization. These reflect Pakistan's commitment to international norms and its pursuit of strategic resilience.

D. Future Trends and Mitigation Strategies

In response to Space militarization, forward-looking strategies are required. The following section will discuss key trends and mitigation measures for Pakistan.

- ***Enhancing Space Situational Awareness***

Pakistan should prioritize enhancing its space situational awareness (SSA) capabilities to monitor space traffic, track satellite movements, and identify potential threats in orbit. Collaborative efforts with international partners, access to space surveillance data, and investments in ground-based and space-based sensors are crucial for improving SSA and mitigating space-related risks.⁵⁷ Developing space debris mitigation strategies, collision

⁵⁵ "Pakistan Favours Keeping Outer Space Free of Weapons," *Dawn*, May 8, 2024, <https://www.dawn.com/news/1832131>.

⁵⁶ Zohaib Altaf and Nimra Javed, "Pakistan's New Space Policy: Overcoming Historical Challenges and Embracing a New Era," *The Diplomat*, December 16, 2023, <https://thediplomat.com/2023/12/pakistans-new-space-policy-overcoming-historical-challenges-and-embracing-a-new-era/>.

⁵⁷ "Prioritising Space Situational Awareness in Your Geo-Spatial Intelligence Strategy," DGI Geo-Spatial Intelligence for National Security, accessed July 02, 2024, <https://dgi.wbresearch.com/blog/space-situational-awareness-geospatial-intelligence-strategy>.

avoidance protocols, and space traffic management frameworks contribute to space sustainability and reduce the risks of space collisions, debris proliferation, and satellite vulnerabilities. Pakistan's participation in global initiatives such as the Space Surveillance Network (SSN), Space Data Association (SDA), and International Collaboration for Space Situational Awareness (ICSSA) enhances its SSA capabilities and promotes responsible space behaviors.

- ***Strengthening Cybersecurity and Resilience***

Integrating space assets with terrestrial networks and communication systems necessitates robust cybersecurity measures to protect against cyber threats, data breaches, and space-based vulnerabilities. Pakistan should invest in cybersecurity infrastructure, encryption technologies, intrusion detection systems, and secure communication protocols to safeguard space assets and prevent unauthorized access or interference. Establishing cyber resilience frameworks, conducting cybersecurity audits, and developing incident response capabilities are essential for ensuring the integrity, availability, and confidentiality of space-related data and operations. Collaboration with international cybersecurity organizations, information-sharing platforms, and best practice guidelines enhances Pakistan's cyber resilience posture and space asset protection.

- ***Promoting Responsible Space Behaviors***

Pakistan advocates for responsible space behaviors, adherence to international space law, and peaceful uses of outer space in its diplomatic engagements and policy initiatives. Participating in space governance forums, supporting space debris mitigation guidelines, and promoting transparency in space activities contribute to global space security and stability.⁵⁸

Emphasizing the prevention of space weaponization, the peaceful resolution of space-related disputes, and promoting space cooperation for scientific exploration and socioeconomic development aligns with Pakistan's commitment to international norms and regulations governing space activities.⁵⁹ Collaboration with like-minded space-faring nations, advocacy for space sustainability principles, and capacity-building initiatives in space law and policy enhance Pakistan's role as a responsible space actor in the global arena.

The security implications for Pakistan arising from Indian space militarization underscore the complex interplay between technological advancements, strategic imperatives,

⁵⁸ "Statement by the Delegation of Pakistan on Agenda Item 51: International Cooperation in the Peaceful Uses of Outer Space (Fourth Committee)," n.d., https://www.un.org/en/ga/fourth/pdf/PakistanEN_item_51.pdf.

⁵⁹ Sahar Iqbal, "Pakistan's National Space Policy," International Bar Association, June 18, 2024, <https://www.ibanet.org/national-space-policy-pakistan>.

diplomatic engagements, and policy responses in the space domain.⁶⁰ Pakistan's proactive approach to enhancing space capabilities, promoting responsible behaviors, and engaging in international cooperation is essential for safeguarding its national interests, ensuring space security, and contributing to a peaceful and sustainable space environment. Collaborative efforts, diplomatic initiatives, and strategic investments are key to addressing emerging space challenges, managing space-related risks, and fostering regional and global cooperation for mutual benefit and shared security in outer space.

Recommendations

Following policy recommendations can be adopted by the policymakers to reduce the risk of arms escalation in South Asia:

- Pakistan and India must develop CBMs focused on specific space-related security aspects to address the security issues and prevent any kind of arms race. Increased clarity regarding space policies and reciprocal commitments to avoid the weaponization of space may alleviate tensions.⁶¹
- Establishing crisis communication channels between Pakistan and India is imperative because of the significant risks associated with miscalculations in militarized space. These technologies would enable real-time communication in response to perceived threats or incidents in space.
- Facilitating regional collaboration in space technology through impartial platforms may contribute to the reduction of tensions. Collaborative initiatives addressing common issues, such as climate monitoring or catastrophe management, may cultivate trust.⁶²

To rectify disparities in space capabilities, Pakistan must prioritize investments in its domestic space technology while pursuing collaborations with allies such as China to enhance its standing in the regional security framework.

Conclusion

Exploring India's space militarization and its implications for regional and global security reveals a complex and evolving landscape with multifaceted dimensions. The security

⁶⁰ Nasreen Akhtar, "Emerging Challenges to Deterrence Stability in South Asia: A Theoretical Analysis," *Journal of Security & Strategic Analyses* 8, no. 2 (2022): 145–62, <https://jssa.thesvi.org/index.php/ojs/article/view/156/134>.

⁶¹ Tughral Yamin and Cooperative Monitoring Center, "Developing Information-Space Confidence Building Measures (CBMs) between India and Pakistan," accessed July 2, 2024, <https://www.sandia.gov/app/uploads/sites/148/2021/07/SAND2014-4934-2.pdf>.

⁶² Abu Hurairah Abbasi and Saher Liaqat, "India and Pakistan Must Collaborate to Combat Winter Smog," *South Asian Voices*, November 13, 2024, <https://southasianvoices.org/geo-c-pk-r-india-pak-smog-diplomacy-11-13-2024/>.

India's Evolving Space Militarization and the Security Implications for Pakistan

implications for neighboring countries, particularly Pakistan, underscore the challenges and strategic considerations arising from India's space militarization efforts. The enhanced surveillance capabilities, communication networks, and navigation systems pose strategic challenges, necessitating the recalibration of defense strategies, crisis management protocols, and deterrence postures. Indian space militarization, therefore, underscores the evolving challenges and opportunities in space security, necessitating a concerted effort from the international community to address emerging risks, promote responsible space behaviors, and ensure a secure and sustainable space environment. Efforts to address space sustainability, space traffic management, orbital debris mitigation, and space situational awareness sharing are imperative for preventing space collisions, protecting space assets, and preserving the space environment for future generations. International cooperation mechanisms, diplomatic initiatives, and adherence to space governance frameworks are essential for managing space-related risks and promoting a secure and sustainable space domain.