

INDO-US SPACE COOPERATION IN THE CONTEXT OF INDIA'S SPACE POLICY

CHANDAN KUMAR THAKUR

From the beginning, socio-economic growth has always been the primary goal of the Indian space programme. Practically every nation has utilised space technology for strategic and socio-economic advancement. There is a consensus among the world community that space is a public good, and there are several treaties. Hence, in regard of this, the Indian government has also laid out its space strategy to safeguard its space interests and effectively handle the current and impending issues that are urgently needed.

In the last 75 years, numerous advancements have been made in the field of space technology to benefit humanity. In the present day and age, space technology is critical to human existence and development. Since space technology offers abundant socio-economic benefits, the number of countries investing in satellite technology has grown manifold. Satellites are now being used for many purposes, such as television broadcasting, navigation, internet use, mobile telephones, etc. Space systems are being increasingly used in various

Mr **Chandan Kumar Thakur** is a PhD candidate at the Centre for United States Studies, School of International Studies, Jawaharlal Nehru University.

fields, such as financial management, education, telemedicine, scientific research and disaster management, to gather real-time information and increase effectiveness and connectivity.¹ Satellite technology also plays a significant role in managing and measuring greenhouse gases and related technologies. In short, we can say that space, as an emerging field, is becoming a substantial component of the global economy.

Here, it is also essential to remember that space technology's dual usage makes it possible to use it for security purposes. The importance of space technology for military applications has been demonstrated from the beginning of the 21st century, especially in the last 10 years. It has gained international acceptance since using space for military support operations like communication, navigation, and reconnaissance does not directly violate the current legal frameworks or international conventions.²

Since the world is moving towards dependence on space-related resources, there is a possibility of international tampering with space-related assets by a state or non-state actor. A spacefaring nation like India investing in the space sector must protect its interests regarding satellite orbital slots, radio frequency, spectrum, etc. The rapidly changing global space order could also give rise to newer challenges.³ Given all these concerns, a country like India needs to formulate a sound and effective policy to secure its space-related assets and their large-scale interest.

INDIA'S ADHERENCE TO THE INTERNATIONAL SPACE REGIME

As India's economy grows in complexity, its dependence on space technology and satellite-driven products has also seen a rise. Being a prominent spacefaring nation, India's main goal for the future is to deploy its space assets for tactical and socio-economic reasons. India encourages space sustainability, permitting peaceful space usage by all the parties involved. India has ratified a number of international

1. Ajay Lele, "India's Space Security Policy: A Proposal", *IDSA Policy Brief*, 2016, https://www.files.ethz.ch/isn/196855/pb_indias-space-security-policy_alele.pdf. Accessed on August 11, 2025.
2. Ibid.
3. Ibid.

agreements or plans of action aimed at reducing possible man-made or natural hazards while simultaneously guaranteeing constant access to space for everybody.⁴

In this regard, the space regime of treaties and norms can be traced back to the Committee on the Peaceful Uses of Outer Space (COPUOS). Established in 1959 by the United Nations General Assembly (UNGA), the COPUOS came up with a set of five treaties for consideration by nation-states. India is committed to adhering to all United Nations (UN) conventions/guidelines with broader global tolerability.⁵

As a reflection of this commitment, India is a party to the Outer Space Treaty (1967), the Rescue Agreement (1968), the Liability Convention (1972), and the Registration Convention (1974). It has also agreed to the terms of the Moon Agreement (1979).⁶

In seeking to play the role of a responsible stakeholder, India accepts the multiple UNGA declarations on outer space. These declarations, in turn, have been framed on the basis of tasks undertaken by COPUOS. India is also a member of the Inter-Agency Space Debris Coordination Committee and has accepted the debris mitigating guidelines in principle.

Though India was not a part of the Group of Governmental Experts (GGE, 2011-13) committee, it agreed to use Transparency and Confidence Building Mechanisms (TCBMs) to ensure space security. Also, while the treaty mechanism is being finalised, India has signalled its willingness to adhere to the European Union's (EU's) proposal for creating an International Code of Conduct as an interim measure.⁷

India has also shown its readiness to engage with the revised version of the Treaty on Prevention of the Placement of

4. Ibid.

5. United Nations Office for Outer Space Affairs, "COPUOS History", <https://www.unoosa.org/oosa/en/ourwork/copuos/history.html>. Accessed on August 11, 2025.

6. Permanent Mission of India to the Conference on Disarmament, "Statement by Ambassador Anupam Ray, Permanent Representative of India to the Conference on Disarmament during Open Ended Working Group on Reducing Space Threats through Norms, Rules and Principles of Responsible Behaviors, Geneva, May 9, 2022", https://pmindiaun.gov.in/Cdgeneva/statement_content/NDQ2. Accessed on August 11, 2025.

7. Lele, n. 1.

Weapons in Outer Space and of the Threat or Use of Force Against Outer Space Objects (PPWT) presented by Russia and China, as a contribution to the various proposals for negotiating a legally binding instrument in the coordination committee.⁸

INDIA MAKES STRIDES TOWARDS SPACE SECURITY

On March 27, 2019, India successfully launched its Anti-Satellite (ASAT) missile test, the announcement of which was made public by Prime Minister Narendra Modi. In line with Modi's communication strategy, the news was announced in a televised special address to the nation. The televised address indicated the importance of the test for India. Expectedly, this test is supposed to have ramifications at global, regional, and local levels.⁹

India's Defence Research and Development Organisation (DRDO) conducted this exercise, using a ground-based missile to attack one of DRDO's own satellites. DRDO has been designing and testing missiles since the early 1980s, including Inter-continental Ballistic Missiles (ICBMs) with a range of over 5,000 km. These missiles have undergone operational testing and are now in the inventories of the Indian Army, Navy, and Air Force. This programme is being expanded with the latest ASAT test. This test is one-of-a-kind because it was carried out with meticulous technical preparation and as a result of India's ambitious policies.¹⁰

China, Russia, and the United States were the only countries capable of launching ASATs before India's drill. India notified these spacefaring nations sufficiently before its test, implying that it wants

-
8. Ajay Lele, "Power Dynamics of India's Space Program", *Astropolitics*, vol. 14, Issue 2-3, 2016, pp. 120-134, 128. Accessed on August 12, 2025; Permanent Mission of India to the Conference on Disarmament, Geneva (2017), "Statement by Miss Rachita Bhandari, First Secretary (Disarmament), Permanent Mission of India to the Conference on Disarmament at the UNIDIR Space Security Conference", https://pmindiaun.gov.in/Cdgeneva/statement_content/NDA4#:~:text=India%20is%20prepared%20to%20give,mutual%20confidence%20and%20raising%20awareness. Accessed on August 11, 2025.
 9. "India Joins Select Group of Nations, Destroys Live Satellite in Low Earth Orbit", Press Information Bureau, 2019, <https://www.pib.gov.in/Pressreleaseshare.aspx?PRID=1569563>. Accessed on August 11, 2025.
 10. G.S. Sachdeva, "Space Policy and Strategy of India," in Eligar Sadeh, ed., *Space Strategy in the 21st Century: Theory and Policy* (Abingdon: Routledge, 2012).

to be fully open in its conduct. India is seeking to improve its space military capabilities. DRDO has established new sensors, satellites, and ground stations to ably deploy space-based assets in military missions for meeting the political objectives. By constructing sensors and satellites, efforts have been made to improve the country's space capabilities.¹¹

This was made possible by the establishment of a new body within the DRDO system, dedicated to space exploration. In addition to the military Defence Space Agency (DSA), DRDO established a space research agency to improve military capabilities.

The Indian military's DSA comprising members of the three armed forces, was formed with the approval of the Prime Minister's Cabinet Committee on Security.¹² The DSA, which is based in Bangalore, and is led by an air vice marshal, will eventually take over the three forces' space-related capabilities. "Work is in progress to provide enhanced Signal Intelligence (SIGINT), Communications Intelligence (COMINT) and Electronic Intelligence (ELINT) capabilities to the defence forces".¹³

MISSION SHAKTI: INDIA'S SIGNIFICANT STEP TOWARDS ASAT CAPABILITIES

Mission Shakti has propelled India into an elite quartet of countries with ASAT capabilities, establishing it as a major player in space and bolstering its deterrence posture, albeit with caveats.¹⁴ Mission

-
11. Manjeet Negi, "India Enhancing Military Capabilities in Space with New Sensors, Satellites", *India Today*, March 26, 2021, <https://www.indiatoday.in/india/story/india-military-capabilities-space-drdo-dsa-sensors-satellites-1784084-2021-03-26>. Accessed on August 11, 2025.
 12. Anoop Verma, "Defence Space Agency: India's Initiatives to Build its Defence Capabilities in Space, the Last Frontier", *Economic Times*, June 13, 2023, <https://government.economictimes.indiatimes.com/news/secure-india/defence-space-agency-indias-initiatives-to-build-its-defence-capabilities-in-space-the-last-frontier/100957779>. Accessed on August 11, 2025.
 13. Ajit K Dubey, "Two Years after Mission Shakti, India Increasing its Military Capabilities in Space", *ANI*, March 26, 2021, <https://www.aninews.in/news/national/general-news/two-years-after-mission-shakti-india-increasing-its-military-capabilities-in-space20210326163947/>. Accessed on August 11, 2025.
 14. Shounak Set, "India's Space Power: Revisiting the ASAT Test", Carnegie India, September 2019, https://carnegie-production-assets.s3.amazonaws.com/static/files/7-30-19_Set_India_ASAT_Test.pdf. Accessed on August 12, 2025.

Shakti has strengthened India's deterrence posture and made it a prominent player in space by propelling it into an elite foursome of nations with ASAT capabilities. As the three leading space powers—China, Russia, and the United States—restructure their military space programmes, safeguard their space assets, and develop new space weapons, military space activities are increasing globally. The leading causes of India's security concerns are China and Pakistan. While the former's ostensible space capabilities would not threaten India, the latter's extensive capabilities led to Mission Shakti, which marked India's initial forays into the role of a central power.¹⁵

With a rapidly growing fleet of satellites for civilian and military purposes, the technical capacity to protect them and the diplomatic ability to form global space governance with like-minded partners is a national imperative. As a result, expanding offensive space capabilities, combined with consistent global and national policies, is critical to maintaining this momentum. As Shounak Set notes, India should take further steps after the success of this exercise by demonstrating a strong political will and creating a national consensus on India's future position in space.¹⁶ India's foreign policy is characterised by three distinct themes: a longing for great power status, overcompensation for the Pakistani challenge, and underestimation of China. While the ASAT test is not an exception to these trends, it offers hope for India's future strategic route.¹⁷

INDIA'S SPACE POLICY: A SIGNIFICANT CHANGE

Space exploration and its application in the military domain have prompted new initiatives to crop up between the world's major powers in contemporary times. China has broken new ground with its impressive Chang'e-4 landing on the Moon, while the US has been focussing on the Space Force. This makes it inevitable for countries like India to up their ante and start competing with the world. Though the Indian space industry remains one of the finest enterprises, providing the world's most efficient, cheap satellites

15. Ashley J. Tellis, "India's ASAT Test: An Incomplete Success", Carnegie India, April 15, 2019, <https://carnegieendowment.org/research/2019/04/indias-asat-test-an-incomplete-success?lang=en>. Accessed on August 11, 2025.

16. Set, n. 14.

17. Ibid.

and space infrastructure, it should not lag behind its competitors. This structural compulsion has forced India to make specific policy changes, thus, enhancing its competitiveness abroad.

Besides this, such changes yield dividends in other realms of international politics, such as prestige and status, and also demonstrate India's capabilities and increase material wealth for others. India's space programme has been shaped by the vision of its founder Vikram Sarabhai who recognised the capability deficit with the advanced economies, and commented that the developing countries will use space assets not to explore the Moon or other celestial bodies but to respond to the "real problems of man and society".¹⁸ India has successfully demonstrated its space power: according to Brent Ziarnick, author of the outstanding book *Developing National Power in Space: A Theoretical Model*, "India's ability to express or show its power within space remains, comparatively, far superior to other states".¹⁹

In its major space policy shift on March 27, 2019, India conducted its first ASAT test, Mission Shakti. This operation successfully intercepted India's live satellite in the Earth's lower orbit, with the help of an anti-satellite ballistic missile covering a distance 300 km, and destroying the target within three minutes. Such an achievement displays India's ability, while giving it prestige as it joins the club of a few countries that can successfully demonstrate such interception.²⁰

India's premier institute, DRDO, developed the missile, and more such development endeavours have been undertaken. New Delhi has been historically wary of being seen as an assertive space power, but the recent success reinforces such an image. In addition to this, the ASAT test was able to hit adversarial objects in space in 2012, but showcased its strength only now, after years of restraint.

18. Aastha Singh, "Remembering Vikram Sarabhai, a Man of Science, Lover of Arts, Student of Space", *The Print*, December 30, 2018, <https://theprint.in/feature/remembering-vikram-sarabhai-a-man-of-science-lover-of-arts-student-of-space/171060/>. Accessed on August 11, 2025.

19. Brent Ziarnick, *Developing National Power in Space: A Theoretical Model* (North Carolina: McFarland Books, 2015).

20. Ankit Panda, "Indian Prime Minister Announces Successful Anti-Satellite Weapon Test in National Address", *The Diplomat*, March 27, 2019, <https://thediplomat.com/2019/03/indian-prime-minister-announces-successful-anti-satellite-weapon-test-in-national-address/>. Accessed on August 11, 2025.

Given the increased risk of Chinese capabilities to neutralise India's critical infrastructure in space, New Delhi was forced to develop a retaliatory capability, which acted as a deterrent, forcing Beijing to act cautiously. This was the first time we had seen DRDO involved in a space mission, and the first time that the Indian Space Research Organisation (ISRO) had participated in a weapons test.²¹

The growth in India's private sector in the space domain marked a significant step, with ISRO wanting to transfer satellite technology to the private sector. This tells us about the promising potential of the private sector in India to exploit the advantages offered by the space industry. Such a transition resulted in the successful launch of the consortium-manufactured navigation satellite, of which the Polar Satellite Launch Vehicle (PSLV), which holds the record for the most significant number of satellite launches, is a part. Among the satellites launched was India's intelligence gathering satellite, the Electro-Magnetic Intelligence Satellite (EMISAT), weighing 436 kg.²²

Most importantly, the confidence that policymakers instilled in the private sector eventually led to some fruitful outcomes, of which the most impressive remains the entirely private Indian space start-up called Exceed Space. It successfully launched the first new space satellite called X Falcon 9.²³ Likewise, India's space industry is also successfully collaborating with Bellatrix Aerospace, resulting in knowledge transfers about different satellite technologies. Such achievement also gives confidence to launch in the global market, thus, attracting new states outside the traditional base. Several such ventures in the Indian space industry include Bellatrix, Satsure, Earth2orbit, Rebeam, Teamindus, Smartenovations, Astrome, etc. India has also started its youth-focussed rocketry club to absorb the active and intelligent talent pool of entrepreneurs and enthusiasts. India's most prominent space company, Teamindus, has delivered the most promising results in this field. The company provides lunar payload services to the US National Aeronautics Space Agency

21. Namrata Goswami and Peter Garretson, "Critical Shifts in India's Outer Space Policy", *The Diplomat*, April 16, 2019, <https://manage.thediplomat.com/2019/04/critical-shifts-in-indias-outer-space-policy/>. Accessed on August 12, 2025.

22. Panda, n. 20.

23. Goswami n. 21.

(NASA), which remains a significant feat. Such an endeavour creates the necessary public engagement, thus, closing the gap between ISRO (necessarily academic) and the general public.

MILITARY APPLICATIONS OF INDIA'S SPACE PROGRAMME: THE MILITARY SURVEILLANCE AND RECONNAISSANCE SYSTEM

Space technology advancements perform the necessary military surveillance and reconnaissance functions for countries like India, as they share borders with states like Pakistan and China. As a matter of global prestige, India's space activities were mainly focussed on the scientific and commercial domains, but they also spilled over into the military realm. Surveillance and reconnaissance systems provide sensing capabilities, which make one aware of one's surroundings, thus, helping in making decisions regarding adversarial attacks. In 2007, India operationalised its satellite-based military surveillance and reconnaissance system, providing essential military intelligence. As Jacob Chirqui notes, India's success in launching satellites enables the setting up of "extensive ground-based surveillance systems, connected to the country's remote sensing satellites", which, in turn, allows it "to keep a watch on all volatile regions, missile silos, sudden military build-ups, and troop movements" in the region.²⁴ Such capability substantially enhances India's ability to monitor security interests and military developments with clear implications for military planning and strategic manoeuvres.²⁵

India's need for reconnaissance became necessary after the Kargil War with Pakistan, resulting in the development of an indigenous reconnaissance satellite capability. This ensured tailing in sensitive border areas of Kashmir and the Western sector. These satellites can provide sensitive information beyond the borders. For instance, the Technology Experiment Satellite (TES) unveiled by ISRO can easily see what is happening on the ground, and distances as small

24. Jacob Chirqui, "Military Applications of India's Space Program: The Military Surveillance and Reconnaissance System", Institute of Peace and Conflict Studies, June 20, 2006, https://www.ipcs.org/comm_select.php?articleNo=2043, Accessed on August 11, 2025.

25. Ibid.

as one square metre can be easily discerned. It can also detect troop movement along the India-Pakistan border, but cannot distinguish between personnel. ISRO claims that its services are civilian-based, but clearly, it can undertake military functions. But this also attracts trade sanctions and opposition from other countries. For instance, in 1992, the US Department of State imposed trade sanctions for missile proliferation activity on ISRO.²⁶

India's satellite capability has enormous importance in maintaining peace in the subcontinent. Getting to know about Islamabad's troop movement and missile launches, New Delhi could make sufficient arrangements to equip itself to thwart Pakistan's aggression. Since Pakistan knows that India would easily detect concealed efforts, it plays safe and rarely engages in such provocation. Thus, establishing deterrence between them. Moreover, Indian satellites have also been successful in locating the major launch platforms of Pakistan with enough certainty, so that any potential attack by Pakistan can be easily thwarted by threatening to dismantle Pakistan's nuclear weapon delivery system. This demoralises Islamabad's revisionist intentions, as escaping Indian detection is impossible.

Likewise, India can use its satellite intelligence capabilities to watch over Chinese movements on the Tibetan plateau. This will provide essential information on the Chinese troops' movement from its central command to the peripheral region. Any significant troop movement would mean capturing the attention of the Indian military command, thus, giving them enough time to prepare for skirmishes, thereby, avoiding a surprise attack from Beijing, which remains its warfighting dictum.

Beyond the security domain, India's space programme can also monitor whether the arms control agreements between the countries are being fully adhered to. Satellite imagery and intelligence can provide sufficient information about this. As highlighted in an article, "Commercial uses for Indian space assets and the sharing of technology throughout the region could facilitate regional confidence

26. Federation of American Scientists, "US Sanctions Imposed on Russian, Indian Space Groups", <https://nuke.fas.org/control/mtr/news/920511-227224.htm>, Accessed on August 11, 2025.

and further current interdependence initiatives such as the South Asia Free Trade Agreement or the proposed Iran-Pakistan-India gas pipeline".²⁷ Such initiatives will decrease the security anxieties between the countries, thus, contributing to arms control and non-proliferation in the region.

INDIA AND THE UNITED STATES: EXPANDING SPACE COOPERATION

The third Indo-US 2+2 dialogue in October 2020 came as a breakthrough. The joint statement issued after the dialogue noted that there was agreement to start cooperation in the specific area of Space Situational Awareness (SSA), which has become indispensable to ensure the peaceful and sustainable use of outer space.²⁸

With the growing importance of space technology in communication and defence, more than 80 countries are now active in space. In addition to these sovereign players, private players have planned to launch thousands of satellites for telecom and broadband services. All these developments give space a congested and overcrowded future, which may make traffic and debris management very challenging. The first step towards safe and secure space is to be aware of the space environment. Real-time awareness about space weather, debris, space assets, and other outer space objects helps us ensure space assets' safety by warning about imminent dangers beforehand. SSA is an effort to generate physical awareness of space, using data on orbiting satellites, rockets, space debris and other space objects entering the atmosphere, and developing the ability to monitor, understand and predict the physical space environment.²⁹

As major players in space with significant investments, India and the USA have good reasons to develop collaboration in SSA.

27. Chirqui, n. 24.

28. Ministry of External Affairs, Government of India, "Joint Statement on the third India-U.S. 2+2 Ministerial Dialogue", <https://www.mea.gov.in/bilateral-documents.htm?dtl/33145/Joint+Statement+on+the+third+IndiaUS+2432+Ministerial+Dialogue>. Accessed on August 11, 2025.

29. Dr Rajeswari Pillai Rajagopalan, "India and the US are Expanding Their Space Cooperation", *The Diplomat*, October 30, 2020, <https://thediplomat.com/2020/10/india-and-the-us-are-expanding-their-space-cooperation/>. Accessed on August 11, 2025.

Any disruption of the space assets of these countries can result in unforeseen social and economic upheaval and dent their military capabilities.

With its growing space programme sophistication and investment, ISRO has recently established a dedicated SSA department. Before this, SSA did not feature on India's agenda in its collaboration bids with other countries' space agencies. Of late, however, there has been a discerning shift in terms of interest on the part of key space players, including the USA and Japan, to work with India on SSA. Recently, ISRO and NASA have launched a satellite named NISAR.³⁰

Until now, ISRO, not a part of the North American Aerospace Defence Command (NORAD) network, could use only limited data to track space debris, and active and passive satellites in orbit. India did not have access to complete real-time data. Instead, ISRO only had access to the Two-Line Element (TLE) dataset; NORAD's specific dataset format was provided to other players free of cost, albeit with limitations. As Dr Rajeshwari Pillai Rajagopalan notes, TLE provides data on space objects orbiting the Earth at a particular point in time.³¹ However, inaccessibility to real-time data mars the accuracy, precision and timely tracking of objects in space.

Today, India operates various communication, navigation, and surveillance satellites such as the Geosynchronous Satellite, Indian National Satellite, Indian Regional Satellite System, Cartography Satellite, and Satellite for Earth Resources (GSAT, INSAT, IRNSS, CARTOSAT, and RESOURCESAT) series. Growth in the Indian space assets and programmers has made it imperative to have dedicated SSA capabilities. The urgency was prominently felt after India's ASAT test in March 2019, which possibly caused the formation of ISRO's Space Situational Awareness and Management Directorate (SSAMD).

As for its SSA capabilities, ISRO started a new initiative called Project NETRA (Network for Space Object Tracking and Analysis). NETRA is envisaged as a mechanism to track satellites in the Low

30. Dr Jitendra Singh, "NISAR Launch from Sriharikota will Upscale ISRO's International Collaborations", Press Information Bureau, July 30, 2025, <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2149078>. Accessed on August 11, 2025.

31. Rajagopalan, n. 29.

Earth Orbit (LEO) in order to prevent damage from space debris or adverse weather incidents. It also establishes several observation facilities, consisting of radars, telescopes, data processing centres, and a control centre, meant to “spot, track and catalogue objects as small as 10 cm, up to a range of 3,400 km and equal to a space orbit of around 2,000 km.” The then ISRO Chairman Dr Sivan had pointed out that NETRA was going to be a part of the global efforts at “tracking, warning about and mitigating space debris.” Eventually, the scope of the NETRA programme is intended to cover the Geostationary Earth Orbit (GEO), at 36,000 km, as well.³²

According to experts, India’s SSA capabilities will comprise a long-range telescope (Ladakh), a radar (northeast India), and a multi-object tracking radar (Sriharikota, southern India). The optical-infrared observatories, which deploy telescopes, are located at Bangalore, Hanle, Mount Abu, Nainital, and Pune. In fact, the Multi-Object Tracking Radar (MOTR) is already being used to conduct space debris proximity analysis in the powered and orbital phases during a satellite launch, re-entry prediction of debris, and TLE catalogue building.³³ As part of the capability augmentation bid, ISRO signed a Memorandum of Understanding (MoU) with the Aryabhata Research Institute of Observational Sciences (ARIES) in June 2020. The MoU covers the domain of SSA and astrophysics.³⁴

As suggested by Dr Rajagopalan, ISRO’s currently limited SSA capabilities can be pooled with those of other partners, including the United States, France, and Japan, to augment coverage and develop more comprehensive systems.³⁵ India can also utilise its amateur astronomer community to serve as another avenue to strengthen its capabilities.

ISRO’s establishment of the SSA directorate is an essential step towards achieving a certain amount of self-sufficiency in tracking and monitoring the space environment, reflecting India’s image as a responsible stakeholder in space technology and development. SSA is a complex, expensive, and challenging area of concern, so these

32. Ibid.

33. Ibid.

34. Indian Space Research Organisation, “Press Release, On MoU between ISRO and ARIES, 2020”, <https://www.isro.gov.in/Release.html>. Accessed on August 11, 2025.

35. Rajagopalan, n. 29.

steps are small. As Moriba Jah, an expert on SSA, explains, "The absence of standardisation and a common 'lingua franca' to 'minimise redundancy and confusion' are issues that need to be addressed. SSA systems will probably need to be adapted with newer applications such as rendezvous and proximity operations, satellite servicing and refuelling, inspection, and space-based manufacturing."³⁶ Owing to the faster growth of small and nano satellites, an emerging future challenge will be tracking small satellite constellations.

Space is a common resource, making international collaboration necessary for effective space management. The India-US initiative towards SSA may be the first step towards pioneering productive international cooperation in SSA and space management.

CONCLUSION

It is true that Vikram Sarabhai, the founding father of India's space programme, and others initially believed that India's space programmes would contribute to socio-economic growth. In a changing world, with time and new strategic thinking, space has been transformed into a significant arena for showcasing one's abilities. As all the major powers are investing in research to develop space capabilities, India cannot remain aloof in such a situation; it must play a significant role to address its security concerns. India's space programme has achieved notable success and garnered numerous awards to date. In the wake of Mission Shakti, India is now regarded as a key player in the space industry, thanks to the acquisition of ASAT capability. Moreover, ISRO's low-budget but successful experiment has struck a chord to the extent that major powers are now looking towards India.

A noteworthy development, simultaneously, is the convergence of the United States and India in space. India stands to benefit from the growing cooperation with the US in space as well as other domains. Notable beneficial initiatives include the joint NASA-ISRO Synthetic Aperture Radar (SAR) mission and astronaut training programmes. India has also shown a more proactive tendency to engage with the US-led space governance regimes in order to be able

36. Ibid.

to shape the ongoing regulatory discussions on outer space. Both the Quadrilateral Security Dialogue (QUAD) and United States-India Initiative on Critical and Emerging Technology/Transforming the Relationship Utilising Strategic Technology (iCET/TRUST) have emerged as reliable multilateral and bilateral fora for specific space-related cooperative measures. The Indian decision to sign the Artemis Accord departs from its traditional preference for a multilateral, legally binding framework negotiated through the United Nations.

At the same time, India has diverged from total convergence with the US on space regime governance. This divergence is reflected in India's voting pattern on US-led resolutions regarding a ban on debris-generating, direct-ascent ASAT missile testing and space threat reduction norms.³⁷ To sum up, the Indian engagement with the US and the multilateral regime on space reflects a mix of strategic and normative considerations. The win-win logic of mutual benefit has seen an intensive growth of bilateral ties in the space sector. India has also played a proactive role in the space governance initiatives. However, at the same time, it has been reticent towards non-binding political instruments used by the great powers in space governance initiatives.

To sum up, it would be unrealistic to expect a fuller symmetry between the Indian and US positions. But there exists sufficient complementarity for India to leverage its space ties with the US in pursuit of its developmental and strategic goals.

37. Dimitrios Strokos, "India's Space Policy: Between Strategic Autonomy and Alignment With the United States", Council on Foreign Relations, June 5, 2025, <https://www.cfr.org/article/indias-space-policy-between-strategic-autonomy-and-alignment-united-states>. Accessed on December 21, 2025.

