

# EXPLORING INDIA'S SPACE DIPLOMACY: AN ANALYSIS

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## **Abstract**

The paper purports to critically examine how space diplomacy has become a significant tool of India's foreign policy and how it can open new vistas to maximise its interests globally. In its recent successful landing on the moon, India has gained the leverage to hold a significant position in the global space community. ISRO's collaboration with the space agencies of the space faring nations such as US, Japan, Russia, France etc. enables India to have access to cutting edge technology and sharing of information. However, there are a few areas where India needs to take significant initiatives to expand its space diplomacy. This paper has delved into those gaps and challenges, and made an effort to discuss how innovation in technology in this domain would enable India to create a niche position in the world.

## **INTRODUCTION**

A country's national interest could be maximised by initiating foreign policies which involve its strategic decision. To secure these interests, there are few aspects such as advancement in science and technology, especially in terms of space, shipbuilding and communications, which play a crucial role. Since independence, India has been looking to enhance its socio-economic growth which eventually led to the establishment of an organisation like the Indian Space Research Organisation (ISRO). ISRO has been successful

in enhancing India's self-reliance in technology, including its economic and international stature.

At this point, it is also important to observe how space diplomacy can play a crucial role in enhancing space technology, especially to commence international diplomatic ties. The integration of knowledge, invention and regulation among nations for improved space application and coexistence is known as space diplomacy. India's space diplomacy is not a recent development. It enabled India to boost its bargaining capacity, as seen when India managed to launch its first satellite by Russia in return for port access. Today, space is viewed as a domain which has the ability to deal with various global issues. At 'DEFSAT', a conference on space held in New Delhi on February 2024, the Chief of Defence Staff of India, General Anil Chauhan, mentioned that space today has become the final frontier. It is huge, vast and remains unexplored. This domain has the ability to open new vistas of economy and could be linked to the future of mankind. Space diplomacy encourages international cooperation to utilise space resources for the Earth's expanding population amidst constraints on space exploration.

India's space diplomacy has developed throughout time. It has been capable of establishing a commercial route for the private space industry in addition to working with other foreign partners. Even though several legislative reforms are still needed to boost private sector engagement, India has become one of the most durable international actors in the space domain.

### **INDIA-US SPACE COLLABORATION**

Apart from getting closer and sharing common interests in the Indo-Pacific, India and the U.S. have enhanced their friendship to include more activities in space. On June 2023, India became the 27th nation to join the Artemis Accord, an initiative led by the US to commence space exploration and cooperation. The accord aims to establish certain norms and principles for peaceful exploration of the Moon, Mars and beyond. However, these principles are non-binding in nature. Apart from the conventional partners of the US like Australia, Japan and Europe, the accord has been able to

attract other signatories such as Saudi Arabia, UAE, Nigeria and now India. During PM Modi's visit to the US, the leaders of both the democracies announced a framework in human spaceflight together in cooperation between NASA and ISRO.<sup>1</sup>

In addition, Washington has also acknowledged the significance of maintaining a continuous and consistent space diplomacy with Artemis signatories. The State Department unveiled its 'Strategic Framework for Space Policy', a strategy to broaden and synchronise diplomatic endeavours with space policy objectives. Among the suggestions are to form two working groups centred on deconfliction and developing partners, and to utilise the accords "as a convening function to help shape discussion around the global governance of space exploration." Furthermore, the leaders expressed their joy at the NASA-ISRO Synthetic Aperture Radar (NISAR) satellite being delivered to ISRO's U.R. Rao Satellite Centre in Bengaluru, and expected the launch of NISAR from India in 2024.<sup>2</sup> Although, the next frontier in geopolitics and diplomacy is space, but unlike the Indo-Pacific, it is uncharted territory devoid of an international order or set of legally binding regulations. This is why it is expected that embracing the Artemis Accords widely and promptly would be crucial.

The joint statement of 2023 between the two countries emphasised on working together on critical and emerging technologies. During their first meeting, U.S. National Security Advisor Jake Sullivan and his Indian counterpart Ajit Doval started the initiative on Critical and Emerging Technology (iCET), where space remains as one of the most significant technology areas in which both the countries are looking forward to collaborate.<sup>3</sup>

In addition, New Delhi and Washington also urged for further economic cooperation between the American and Indian corporate sectors through the value chain of space economy. Although India's wager on this vision represents a significant step towards the adoption of these tenets globally, space diplomacy is still desperately needed.<sup>4</sup>

## **INDIA-EUROPEAN UNION SPACE ENDEAVOURS**

Considering its strategic interests, EU has initiated tools which would enable it to take upon the role of a significant player in the space domain. The Earth observation component of the European Union's space mission is called Copernicus. It promotes international cooperation through its free, full, and open data policy in addition to its capacity to address global issues. Copernicus services, which were created especially to satisfy user needs, provide near-real-time data at the local, regional, and worldwide levels. It has already offered services to deal with disaster issues to countries like Australia, Belize and also to our northern adversary Pakistan.

However, in terms of using and sharing data, India remains a significant partner for EU apart from United States, Australia, Brazil, Colombia, Chile etc.<sup>5</sup>

India has already commenced its Earth Observation Programme with the support from Department of Space (DOS) of India and ISRO. This eventually encouraged the European Commission and India's DOS to ink a Cooperation Agreement on March 2018, which would provide mutual access to the data from the Indian Earth observation satellites and the European Union's Sentinel series of satellites.<sup>6</sup>

## **INDIA'S COLLABORATION WITH FRANCE ON SPACE**

India's endeavours on space research with France dates back to the 1960s. France's role was considered very crucial in supporting India's Rohini Rocket Program. In 1998, both the countries elevated their relationship by launching the 'Indo-French Strategic Partnership' which marked the start of a new phase in space cooperation.<sup>7</sup> On January 2024, both the countries inked the historic 'Defence Space Agreement'. Such an agreement commences the launching of both defensive and offensive capability equipped military satellites. President Macron and Prime Minister Modi reaffirmed their commitment to enhance their space exploration and research activities. This would mostly involve innovation of technologies, launch of payloads and put more emphasis on design and production. In addition, creating

connections between the start-ups and the users are of utmost significance, which the recent agreement has focused on. Both the leaders also gave their consent for the 'Letter of Intent on Defence Space Cooperation' which would endeavour to engage in more and more joint initiatives between 'Centre National d'Études Spatiales (CNES)' and 'ISRO'.<sup>8</sup>

In addition, analysts opine that such initiatives are commenced by concerns related to China. The country's space activities might have acute implications for the global balance of power on space. The 'India-France Defence Space Agreement', could partially be a response to such activities on the space frontier.

### **INDIA-RUSSIA SPACE ENDEAVOURS**

Following the Gaganyaan mission, both India and Russia aspire to work together on various space projects. Moscow offered the Indian Air Force pilots with training bases which remained one of the most successful experiences. Both the countries have already commenced the setting up of ground stations within each others borders. This is mostly done keeping in mind their respective satellite navigation systems such as GLONASS (Russia's system) and NavIC (India's system). It is expected that such initiatives will enhance the accuracy of the satellite navigation especially for civilian use. India is also making an effort to make few parts for GLONASS.<sup>9</sup>

Furthermore, there are new opportunities opening up for space cooperation between the two countries. Zeus TEM (Transportation and Energy Module), a deep space mobility platform developed by Russia's national space agency, is one of them. It has the potential to drastically change the global trajectory of human space exploration and open up new opportunities for space cooperation between India and Russia. Historically, the space objects launched by the Soviet Union in the 70s and 80s were propelled by thermoelectric nuclear-powered engines. They were mostly used for surveillance purposes and lasted for a short period of time. However, the post-Soviet era emphasised on deep space exploration. To support that, NUKLON Space Complex was created by Roscosmos making Zeus, the

nuclear powered space tug, the key component of NUKLON. Although Zeus is not the first nuclear-powered spacecraft, it has special capabilities such as, if launched once it can be in space for several years, making it more efficient than the other spacecraft which use liquid or solid fuel.

In the above backdrop, it is beneficial that New Delhi deepen its space collaboration with Moscow.<sup>10</sup>

In 2021, both the countries inked an agreement and promised to enhance their cooperation especially in the human spaceflight programme. The joint statement between Moscow and New Delhi emphasised on a cooperation between the Russian State Space Corporation 'Roscosmos' and the Indian Space Research Organisation (ISRO).

Four Indian astronauts have already undergone generic space flight training in Russia as part of the Gaganyaan programme, India's first manned space flight mission.<sup>11</sup> Furthermore, both the parties wanted to improve collaboration within the 'UN Committee on the Peaceful Uses of Outer Space' (UN COPUOS), particularly with regard to concerns about the long-term sustainability of space operations.

## **INDIA-JAPAN SPACE COLLABORATION**

India and Japan have exhibited their friendship in the space domain since long back. Japan has hosted several annual meetings of the Asia-Pacific Regional Space Agency Forum (APRSAF) where Japan Aerospace Exploration Agency (JAXA) fostered space cooperation, space diplomacy and sharing of technological advancements. India joined APRSAF in 1992, where both the countries aspire to utilise space technology for their socio-economic development. In addition, both Tokyo and New Delhi played a significant role in execution of the Sentinel Asia Project which was advocated for the first time in 2005.

In 2019, both the countries held their first 'Japan-India Space Dialogue' meeting in New Delhi and the second meeting was held virtually in November 2021. These dialogue meetings made efforts to have a clear understanding of the space policies for both the sides. Through these dialogues, JAXA and

ISRO plan to exchange information on critical areas including space assets, space industries etc. The leaders held discussions on the Global Navigation Satellite Systems (GNSS), which are crucial for disaster management and SSA.<sup>12</sup>

On May 2023, when the four leaders of QUAD met in Hiroshima, space continued to be a major topic of conversation. Commercial space cooperation, space situational awareness including sharing information on climate change were deemed pivotal areas which required collaboration from all the four QUAD members.

In order to initiate good paying jobs, the leaders realised the growth of the space sector, which would also enhance the space supply chains. The QUAD members are also aware of space traffic management, and fostered sustainability of the outer space environment in the QUAD summit of 2023.<sup>13</sup>

Meanwhile Washington and Tokyo are cooperating on a long list of space initiatives. The level of collaboration between Tokyo and New Delhi does not appear as extensive as it is between Washington and Tokyo. On January 2023, the two spacefaring nations inked a framework agreement which would be the base of their joint human space exploration effort.

Through such agreements NASA and JAXA aim to send humans back to the moon by 2025, creating a long-term presence there to support deep space exploration and Mars missions.<sup>14</sup> Although New Delhi and Tokyo plan to jointly hunt for water in the lunar south pole in 2025, there are several factors which cannot match up to the Tokyo-Washington partnership.

## **INDIA-AUSTRALIA STRENGTHENING SPACE INITIATIVES**

Australia and India have a lot of potential to work together to further their respective interests in space. It is believed that countering commercial and military competition by collaboration is the best course of action in the current times. In order to support India's Gaganyaan human spaceflight missions, the Australian Space Agency and the Indian Space Research Organisation have established a base station in the Cocos Islands of Australia. They are also involved in joint technological development. Cassandra Steer, in the

Australian Strategic Policy Institute, mentioned in September 2023, that with \$20.69 million in funding over four years, Australia's International Space Investment (ISI) initiative seeks to collaborate with industrial partners and researchers in India and Australia.<sup>15</sup> The majority of space activities have dual uses, thus there are direct security benefits even if the Fund's primary goal is civil space cooperation. Furthermore, Australia has a long tradition of space domain awareness, developing laser communication mostly to support the military needs. Meanwhile, India possesses an exceptional capacity for rocket launches, as seen by its successful landing on the moon in 2023. These are the aspects that India and Australia should complement and collaborate on with each other.<sup>16</sup>

### **CHALLENGES IN ELEVATING INDIA'S SPACE DIPLOMACY**

- Linguistic and cultural barriers remain between Indian and Japanese space industry professionals.
- COVID-19 pandemic severely impacted the trade collaborations across the globe and the space industries were not spared. Space diplomacy and scientific developments were hindered due to lack of coordination as a result of travel restrictions. Many Japanese engineers and scientists couldn't work further on collaborative projects. This has highly impacted the India-Japan space endeavours.<sup>17</sup>
- Japan has high regards for India's advancement in technology, especially the skilled manpower in the space domain. Despite that, the collaboration between the Japanese and the Indian space professionals is quite challenging when compared with the Americans and the Japanese collaborations.
- JAXA has several collaborative projects with the Southeast Asian countries, especially Thailand. Comparatively, India's space collaboration with Japan, despite being a technology giant, is very limited. According to Hirokazu Mori, a space business consultant from Japan, there is a lack of cash flow between the two countries which has constrained the growth between the space industries of the two countries. He also added that both



Japan and Thailand stand on an equal footing in terms of investment and exchange of geospatial information. This reciprocity is missing in India-Japan space cooperation. Therefore, although Tokyo and New Delhi has the ability to surpass space engagements with Japan and Southeast Asia, the lack of financial flow remains a barrier between the two countries.<sup>18</sup>

- Within QUAD, both India and Japan have different strengths. Japan is good at manufacturing small spacecrafts and has been successful in initiating space exploration missions like Hayabusa. Meanwhile, India has been able to exhibit its space prowess through its successful Chandrayaan mission. But in the current times, Japan has been facing economic limitations, while India is a country with a growing GDP along with technological advancement which is necessary for space endeavours. Mr Mori opines that if both the countries can combine their forces, they could do great in the realm of exploratory missions. Meanwhile, another member of QUAD, the US, is ahead of everyone else in terms of Earth observation and satellite communication. It is crucial for Tokyo and New Delhi to also find such niche areas where they can lead in the space domain at a global level.<sup>19</sup>
- The space industries in India are closely related to the government, especially in terms of fund allocation. When compared with other space faring nations including Japan, the allocation of funds in India is not transparent. Mr Mori mentions that the procurement processes like Requests for Information (RFI) and Requests for Proposals (RFP) are more straightforward and simpler in Japan. In addition, the industries in India cannot easily be a part of government funds or projects.<sup>20</sup>
- Since the 1990, the European government started collaborating with China, especially on space technology. In 2003, the “Joint Sino-European Satellite Navigation Cooperation Centre” was opened in Beijing. And later, they developed the Galileo, Europe’s global navigation satellite system. China also promised to invest millions of dollars in space technology to make it one of the most important non-EU partners in terms of space

technology. The EU has already developed a relationship of trust with China and terms of the civilian use of space.<sup>21</sup>

- New Delhi's collaboration with Moscow on space, especially on the Zeus Project, might have an impact on India-US space cooperation. This might constraint India's access to significant American space technologies including commercial space activities, human spaceflight, etc.
- Russia's closeness towards China has already been a concern in the international community. India needs to exercise caution to ensure that the US and its allies do not view its cooperation as a space weapon that could lead to the implementation of sanctions.
- When compared with Russia-China space cooperation, India's cooperation with Russia is not that close and aligned. Russia has already collaborated with China on major space aspects including the creation of an 'International Lunar Research Station' (ILRS) and aims to increase the time of robotic and human presence on the Moon. They also look forward to initiating a joint mission to both Mars and the Moon. Meanwhile, India's space engagement with Russia is limited to specific projects. This could involve training Indian astronauts in missions such as the Gaganyaan.<sup>22</sup> In addition, India has space collaboration with other countries including the US, France, Australia, etc. This could probably limit India's scope to deepen cooperation with Russia, considering it has alternative space partners.
- Space radar capabilities have become a key feature for AUKUS Pillar II, despite nuclear powered submarines remaining as the major pillar for AUKUS. Strengthening Space Domain Agreement (SDA) networks became a crucial aspect to respond to the increased investment in space capabilities by China and Russia. In order to strengthen its space data access, the US has been actively building networks with its allies, signing over 170 non-binding agreements with different governments, businesses, academic institutions and non-governmental organisations.<sup>23</sup> However, India is not a party to such multilateral space partnerships. This could definitely limit India's access to cutting edge technology. Furthermore,

India might not be able to play a proactive role in the space domain if it doesn't participate in such a regional space multilateral endeavour.<sup>24</sup>

## RECOMMENDATIONS

- India should make efforts to be a part of or develop stronger connections with multilateral space cooperation. This is mostly in the context of AUKUS Pillar II, which emphasises developing space capabilities. Such initiatives will enable India to become a part of SDA data sharing and enhance its space capabilities.
- Mr Mori added that there is also a lack of participation in the Indian Space Conferences by the Japanese Government officials and similarly, the presence of Indian officials or space professionals present in Japanese space events is very limited. Furthermore, there should be more participation of young minds in such events. However, bureaucratic red-tapism could be a barrier in promoting the young generation to foster innovation and collaboration in this field.<sup>25</sup>
- Although there exists a comprehensive partnership agreement between India and Japan, there lacks a full-fledged or a long term plan which could include detailed plans like 'a five year plan' or 'a ten year plan'. On the contrary, Tokyo has such detailed plans with Washington, making their relationship stronger and deeper in this domain. With India, the relationship is still limited to a few projects. It is necessary that India and Japan make proper plans for cooperation and promise to stick to those plans and make them successful.
- It is important to facilitate better collaboration between space industries and the government so that it can extend its space diplomacy with the foreign nations later.
- Today, India's success, especially after the successful landing on the moon, has gained global inspiration and attention. This has enabled India to achieve a higher position in the space club and emerge as a voice of the Global South. India can definitely utilise this as a means to explore and meet India's space diplomacy ambitions. In the space club,

India's ambitions should be to enhance its strategic partnership in deep space exploration and space technologies, which includes bridging its gaps in sectors of satellite manufacturing, space exploration technology, cutting edge technology like propulsion system, simulation of avionics & aerodynamic of system exposed to vagaries of space.<sup>26</sup>

- Sharing of data and infrastructure with like-minded countries is vital for India's space diplomacy. Japan and Russia could share its space data with India and in return, India could share its physical spare infrastructure and cost effective manufacturing capacities with them.
- Futuristic Mission Capabilities like human space flights, International Space Station and interplanetary human missions could be the focus areas for India to expand its space diplomacy.
- India's space achievement enables it to explore its space diplomacy in the Global South. A few initiatives like 'UNISpace Nanosatellite Assembly & Training by ISRO' (UNNATI) makes an effort to educate young scientists from the Global South in space sciences.<sup>27</sup> India would also commence the creation of data portals specifically for Pacific region countries that are fifteen times smaller. This data portal is expected to bring in a definite change in these countries. A few visible advantages will be the prediction of an early warning water management system, urban space management and fishing. Although these would have the ability to bring direct impact in the Global South, their proper execution and implementation is of great salience to achieve the interests and the objectives.
- Countries like the US, Russia and France have advanced space programmes whereas other friendly countries like Japan & Australia are emerging space tech powers. India can collaborate with these powers in the following areas to enhance its indigenous space technology capabilities:
  - o Transfer of Technology (ToT) in Specific Areas: Indian space programme has certain gaps which could be filled through ToT, especially in terms of advanced satellite technology, telescope,

communication units, deep space exploration capabilities and human space flight expertise.<sup>28</sup>

- o Capability Building: This can be done by joint satellite missions, sharing of expertise and infrastructure, building a pool of skilled workforce capable of leading indigenous space mission, etc.
- o Sharing of Resources: Due to geographic layout, sharing of assets is very important. It enables round the clock connectivity. Thus sharing of such resources is significant.
- o Establish favourable regulating framework & policies that promote India’s interests.
- o Learning from best practices of the space agencies of these countries.
- o Ongoing and desired cooperation is as given below:

**Table 1.**

<b>Current</b>	<b>Desired</b>
Russia <ul style="list-style-type: none"> <li>• Gaganyaan manned space mission in space station</li> </ul>	<ul style="list-style-type: none"> <li>• Inter Lunar Research station</li> <li>• Fuel technology</li> <li>• Upstream capabilities</li> </ul>
US <ul style="list-style-type: none"> <li>• INDUS - X</li> <li>• Two projects already launched under this initiative.</li> <li>• Sharing of space situational awareness data.</li> <li>• Sharing of high precious non-military data</li> <li>• Artemis programme</li> <li>• Lunar Base</li> </ul>	<ul style="list-style-type: none"> <li>• SSA</li> <li>• Launch Vehicle</li> <li>• Space fit management (Classified Information and unclassified contexts)</li> <li>• Downstream application</li> <li>• Analytical capability</li> </ul>
France <ul style="list-style-type: none"> <li>• Structural and organisational challenges experienced in defence capabilities</li> </ul>	

Source: Online interview with Lt Gen Karambir Brar, 28 February 2024

- To extend its space diplomacy, development of indigenous technology is salient for India. These are the following areas where India can focus on:
  - Global tracking & data relay space.
  - Inter satellite link communication.
  - Reusable launch vehicles.
  - Multiple payload satellite for ISR with global reach.
- In the QUAD grouping, all members are space powers, with the US being the most developed one and others being emerging ones. The unique geographical location of these countries makes it very conducive for them to share resources for the benefit of the world. Some of them are discussed in the following points:
  - QUAD as a framework for use of space: QUAD can be used for norm setting and rulemaking to ensure transparency, non-proliferation & peaceful use of outer space.
  - Technology cooperation: Technology cooperation amongst QUAD members especially in development of capabilities in the field of space law. The four QUAD members should emphasise on information sharing, which would enable them to expand their space diplomacy with each other.
  - Establishment of Earth station in Australia: An Earth station in Australia could be of great significance considering its unique location in the Southern Hemisphere. Furthermore, Australia offers the opportunity for location of Earth station for enhanced visibility, connectivity & SSA, radar and telescope capabilities.
  - Information sharing and confidence building: Information sharing and confidence building measures like notification mechanism, crisis communication channels, etc. need to be established.
  - Regional organisations and multilateral forums: Engagements of regional organisations and multilateral forums for collaborative approach to space governance is very significant.
  - Co-operation in space debris mitigation, cyber security & resilience of space system & infrastructure.

- o Satellite communication, navigation, climate monitoring & environmental protection are certain areas where the QUAD members can jointly act on.
- Artemis Accords have strategic implications. They presently have western overtones and countries like China & Russia do not agree with these. India signed these Accords in June 2023, and firmly put its weight behind these US led initiatives. Although the basis of the Accords lies in the United Nations Treaty on Outer Space of 1967, and the principle seems to be benign, it should be noted that its signatories, except the US, Australia, Japan & India, have limited space capabilities. There are anticipations that in the future it might form an alliance amongst these four countries for sharing space resources.<sup>29</sup> India can play an important role in the group by actively engaging with all partner countries and focusing on the following:
  - o Transparent and inclusive space governance.
  - o Confidence building measures, to avoid any confrontations in space.
  - o Sustainable use of space resources.<sup>30</sup>
- Despite their difficult relationship, India and China collaborated on global issues such as climate change. In the present times, space is considered as one of the most significant frontiers and China being a significant seafaring nation could play a crucial role in terms of formulating conventions and laws, especially when it comes to governing the space. In this context it is vital that India should collaborate with such nations in development of international space laws. Furthermore, Beijing and New Delhi could launch space exploration projects that are both widely recognised and viable.

## CONCLUSION

India's space endeavours with spacefaring nations such as the US, France, Japan, Australia and Russia have enabled it to become a significant member of the space community. India now has space aspirations that extend beyond its borders and prioritises peaceful exploration in order to

achieve sustainability and other benefits for civilian use on a worldwide scale. However, India's space diplomacy compared to Russia-China, US-Japan or US-Europe remains limited. This is mostly due to technological disparities, limited financial flow and various other factors. But currently India's initiatives such as *Atmanirbharta*, emphasising on indigenously built technologies, utilising frameworks such as the QUAD and other initiatives taken by ISRO could give India the leverage to utilise this final frontier and advance its space diplomacy.

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