Leveraging Indian Space Capability through Military Diplomacy in South Asia

Gurpreet Singh Bajwa

Abstract

The Indian Space domain capability can be expanded in the South Asian Neighbourhood for offering solutions in the ISR, communication, Meteorology, Navigation, Guest Astronauts for the Human space flight programme and space infrastructure building. India's South Asian communication satellite launched in 2017 was one such initiative leveraging the space capability for diplomatic outreach and developing the new space services market for Indian enterprises.

The Indian Military has a strategic and friendly relationship with the neighbouring militaries and now the time has come to upgrade the existing security cooperation through Military Diplomacy and believe in the dictum of India's 'Neighbourhood First Policy'. India's growth is tethered to a secure and well-governed South Asia and the emerging space market is one of the sunshine sectors which like India's outreach to evolve the digital payments ecosystem can also be employed to improve the cooperation in South Asia.

Colonel **Gurpreet Singh Bajwa** is a Senior Fellow (on study leave) at the Centre for Land Warfare Studies (CLAWS), New Delhi.

This article will analyse how India through its military diplomacy can enable better security, border management and smart governance solutions through efficient space applications and custom created space solutions for its neighbours based on the principle of mutual respect, mutual trust and mutual cooperation.

'I can clearly see that the world is moving very fast towards a new world order, towards new systems, after the Corona period. This is a turning point that we as India should not miss this opportunity. India's voice should also remain vociferous on the main table. India should not underestimate itself for a leadership role.'

—Prime Minister **Narender Modi**
at Lok Sabha on 7 February 2022[1]

Introduction

The Ukraine conflict has once again highlighted the use of the space domain for intelligence gathering, data connectivity and utilisation in the information operations. The Russian ASAT test in mid-November preceded the conflict, the Russian build-up was beamed across the TV channels world-over showcasing the role of the commercial satellite imagery providers. The imagery showcasing destruction of infrastructure and the chaos of the 40-mile convoy en route to Kiev are just a few examples of ubiquitous utilisation of the space domain in the conflict. India now has a major role in the post-COVID new world order which is accelerating towards Great Power Competition.

New Delhi's 'Neighbourhood First' policy in 2014 was preceded by multiple initiatives for increasing regional cooperation. In 1985, South Asia Association for Regional Cooperation (SAARC) was launched in Dhaka with Bangladesh, Bhutan, India, Nepal, Sri Lanka, Maldives and Pakistan being the founding members of the initiative. Afghanistan joined the grouping in 2007. In 1997 new multilateral initiatives were launched as the Indian Ocean Rim Association (IORA) and Bay of Bengal

Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC). In 2013, Bangladesh, Bhutan, India and Nepal (BBIN) working groups were created on Connectivity, Transit, Water resource management, Power, and the Motor Vehicle Agreement was signed in 2015. All these initiatives focussed on improved connectivity and trade, but proxy war and sponsorship of terrorist activities has hindered the growth of regional cooperation. India should continue to move ahead with bilateral and multilateral mechanisms to improve connectivity and trade in the region.

World Bank[2] has reported that the inter-regional trade within South Asia was only 5 per cent against a whopping 30 per cent in ASEAN region and 60 per cent in Europe. India's EAM S Jaishankar in 2019[3] had noted that 'while regionalism took root in every corner of the world but we have lagged behind, as South Asia does not have normal trade and connectivity as other regions do'. Earlier, during the cold war, India had embraced strategic insulation through non-alignment and missed out on the regional connectivity benefits enjoyed by Europe and ASEAN. The political lines of division have cut across the natural ecosystems, economic spaces and ethno-lingual groups. Now a new regional construct is required to encompass shared culture and values and a common marketplace. India has to move fast and prevent any implementation gap as the competition (China) is quite fierce in all domains.

It was the pragmatic realisation that India's interests would be best achieved by building a web of dense interdependencies with our neighbours who must be given a stake in our economic prosperity that is the driver for the 'Neighbourhood First' policy. The new paradigms of 'Sab Ka Saath, Sab Ka Vikas' and 'Security and Growth for All in the Region' (SAGAR) are the implementation guiding principles. India to prevent the ingress of China's infrastructure debt traps and technological prowess into the neighbourhood has tied up with global economic powers for the trilateral infrastructure group mechanisms. Delhi and Japan are

now building a new port terminal in Colombo[4] and India has a tie up with Russia to develop nuclear energy plants in Bangladesh.[5] However, USA's aid grants to Nepal[6] declared in 2017 had seen stiff resistance in 2022, before acceptance.

The space market is expanding due to lowering the cost of access to space by using disruptive technologies like reusable rockets and LEO based satellite communication constellations and miniaturised sensors. The increasing benefits of space-based applications are capturing newer markets. Space is a strategic domain whose biggest users earlier had been the military and the governments for the benefit of society. As commercial needs grow, the space sector is expected to expand to a trillion-dollar market by 2040 from the existing $350 billion. The cost to launch a satellite has now dropped to $60 million from the earlier $200 million with a potential drop to $5 million. The satellite manufacturing has also been transformed due to mass manufacturing i.e., from $500 million to only $500,000.[7]

The Ukraine conflict has once again highlighted the use of the space domain for intelligence gathering, data connectivity and utilisation in the information operations. The Russian ASAT test in mid-November preceded the conflict, the Russian build-up was beamed across the TV channels the world over showcasing the role of the commercial satellite imagery providers as also the destruction of infrastructure and the chaos of the 40-mile convoy en-route to Kyiv, are just a few examples of ubiquitous utilisation of the space domain in the conflict. Elon Musk offered a sparring match with President Putin and also publicly enabled internet operations of the STARLINK constellations over the conflict zone, while ONEWEB had to shift their dependency to SpaceX for their remaining launches, the ISS remained the zone of cooperation despite public spats to the contrary, the on-going race for the Great Power Competition threatens the space domain to split into two astrophysical groups reflecting the ground realities of the Great Power Competition.

China's 'Space Information Corridor' has been clubbed along with the BRI since 2016 giving access to the client states services based on Beidou Navigation constellation, the Fengyun weather satellite constellation and terrestrial satellite control and relay data nodes.[8] The Chinese space actors have already gained footprints in Pakistan, Bangladesh and Sri Lanka. The Chinese space companies are providing launch services, fabrication of communication satellites and ground stations besides offering Pakistan a guest Taikonaut a visit to its space station which is now fully operational.

Space also provides avenues for unprecedent International Cooperation as was seen in the operation of the international space station even during the cold war. It is essential that South Asia adopt smart solutions derived from space applications for protecting its population, economic interests, sovereignty and safeguarding against threats from non-state actors. Commerce builds trust and leads to expansion of trade, as relations grow warmer more trade barriers are lifted, regulations are eased, trade and tourism increase and a new security architecture evolve. Space cooperation within South Asia is a low hanging fruit which can be diplomatically exploited to accelerate regional cooperation.

India needs to acknowledge its role in South Asia as 'Net Security Provider' and enable access to space-based security and smart governance solutions to its neighbours. In the emerging space domain security setup, India should engage in military diplomacy in the space domain and conduct Space domain enabled exercises with both its strategic partners and its neighbours. The ensuring of safe space operations necessitates the need for a space situational awareness, ISRO already has operationalised its observing telescopes alongside Multi-Object Tracking Radar at Benagaluru, but more capabilities are required for independent operations. Any existing gap can be bridged through collaboration and also leveraging emerging commercial players in the Indian Space Sector. There is also a need to conduct periodic security audits of space assets, networks and ground stations, which can be enabled by India.

India's emerging space start-up and private industry ecosystem will also have a huge payoff with multilateral collaboration through the Indian Space Association (ISpA)[9] and Indian National Space Promotion and Authorization Centre (INSPACe). Any capacity deficit in manpower for space operations in our neighbourhood can also be bridged by the huge talent pool available in India.

ISRO International Cooperation

ISRO has the highest inventory of satellites, launch vehicles and developed space-enabled services useful for providing smart governance solutions in South Asia. The objectives of collaborations are to enhance the capacity of the Indian Space Program, strengthen diplomatic relations and formulate global guidelines on space. ISRO has concluded about 250 Space agreements with 59 countries and five multinational bodies as of June 2021.[10] The ISRO's space program has been shaped with international cooperation. Its erstwhile benefactors like USA, Russia, France and Japan have now become equal partners in many joint endeavours and it also trains space personnel from Asia Pacific Region as per UN mandate. Internationally, India is viewed by space-faring nations as an emerging space power, capable of achieving its goals in a more cost-effective and time-efficient manner. Specifically, the developing countries look to India for assistance in building up their capabilities to derive benefits of space technology. The cooperation domains[11] include:

- Realisation of Joint Satellite Missions. (MEGHNA-TROPIQUE, SARAL, TRISHNA (France), NISAR (USA).
- Accommodation of Payloads. (CHANDRAYAN-1, OCEANSAT-2, ASTROSAT)
- TTC Stations in Brunei, Indonesia and Mauritius and a remote sensing data reception station in Antarctica.
- Disaster Management. (International Charter, Sentinel Asia, UNSPIDER, Search & Rescue) ISRO supports disaster management

activities across the globe by sharing satellite data and expertise. ISRO is also part of the Satellite Aided Search and Rescue (SASAR) Program and providing operational services to the users in India and seven neighbouring countries since 1998.

- Capacity Building (CSSTEAP, UNNATI)
- Participation in Advisory Committee on Policy Regulations.

Dr Vikram Sarabhai was able to create the Space programme with humble beginnings at Thumba Equatorial Rocket Launching Station (TERLS) with the international cooperation from both superpowers, i.e. USA and USSR and also France, later, TERLS was given UN sponsorship in 1968. Some of the important international partners' cooperation are enumerated below.

Russia (USSR). USSR provided a free launch for India's first Satellite named ARYABHATTA, and also later two experimental Earth Observation Satellites. A satellite optical ranging and tracking station was established in Kavalur as part of USSR's Inter Cosmos Network. A guest cosmonaut Wing Commander Rakesh Sharma visited the SALUT 7 Space Station in April 1984. But with former USSR disintegrating, Russia could not supply the contracted cryogenic engine due to the USAs intervention in Missile Technology Control Regime (MTCR). This led to a delay in GEO launch capability by 15 years. Similarly, the Lander for CHANDRAYAN-2 was not supplied by Russia after contract when it realised an anomaly in its Mars Lander Phoebes-Grunt mission. In 2011 India launched a jointly developed Russia's student Satellite YOUTHSAT. Russia is now enabling the human space flight programme GAGANYAAN and assisting India by thorough training and equipment like space suits, life support systems and radiation shielding solutions.

USA. NASA had provided Micro Lock Satellite Telemetry Data Reception Station at Physical Research Laboratory in Ahmedabad in

1962. MoU with NASA enabled India to access Satcom of ATS 6 Satellite for one year. Later a SITE broadcast experiment i.e., Satellite Instruction Television Experiment was conducted in 1975-76, this was the precursor to the Television proliferation in the nation. INSAT 1&2 were made by Ford Aerospace Communication Corporation. A ground station was established near Hyderabad to receive imagery from American LANDSAT satellites. CHANDRAYAAN-1 carried two NASA payloads, one of them Moon Minerology Mapper (M3) led to conclusive discovery of water on the Moon surface. Radar Tracking support for MARS orbiter mission was also provided by the USA. Joint development of an ISR satellite (NISAR) is presently in progress.

France. In 1974-78, France transferred the Viking liquid rocket engine technology in exchange of the participative development of the Ariane launch vehicle. Earlier, for the TERLS. Sud Aviation had licenced manufactured CENTOUR II B sounding rockets on-site, enabling Indian scientists to innovate on the solid propellant technology to manufacture more energetic and better solid propellants for Satellite launch vehicles, by 1981 Ariane launched India's first communication satellite as APPLE (Ariane Passenger payload experiment), France (CNES/ESA) has been actively banked upon for launch of our INSAT/GSAT series to the Geosynchronous Transfer Orbits (GTO). France is now assisting ISRO in the Human Space flight mission.

Japan. India is discussing collaboration for in-situ analysis of ice on the Moons North Pole. Japan has also hosted Asia Pacific Regional Space Agency Forum since 1993. ISRO & JAXA co-hosted the forum for two sessions in 2007 and 2017.

UN Office of Outer Space

- India has played an active role in the formulation of five international treaties and adoption of six principles in the space domain**.** India signed and ratified the *Outer Space Treaty, Rescue Agreement, Liability*

Convention, and Registration Convention. India has signed the Moon Treaty, but has not ratified it.[12]

- Under the UN aegis India also enables **c**apacity building for Asia-Pacific through the Indian Institute of Remote Sensing (IIRS) and Centre for Space Science and Technology Education for Asia Pacific (CSSTE-AP)[13] both in Dehradun. ISRO has also offered an 8-week capacity building programme on Nano-Satellite Development for the UN i.e.—UNispace Nanosatellite Assembly & Training at Bengaluru (UNNATI).

Indian Space Sector Reforms

The government has now decided to promote the private sector which will further build the brand of the ISRO enabling the government to act as an enabler and aggregator. The INSPACE is expected to be fully functional by First quarter of 2022. It will be based out of Bangalore and Ahmedabad to enable around 50 space start-ups and existing industry players which are expanding the ecosystem consisting of upstream companies which are making satellites, rockets, propulsion systems and new rocket fuels and the downstream companies which are looking at analysing the satellite data to provide services to the consumers in agriculture, insurance, infrastructure planning and maintenance, etc. The Space legislation and policy enabling frameworks are also likely to be released this year. Hence, going forward, the international collaborations will also see the new entrepreneurs looking for newer markets and providing competitive space-enabled services around the globe.

Need for New Global Space Rules

The imminent privatisation of space resources and the weaponisation of outer space, points towards the limited scope of the Outer Space Treaty 1967, a review of the same is essential Already the USA and Luxemburg laws have been incorporated against global commons enabling the private

industry to mine resources from Mars, Moon and Asteroids. The return of the competition amongst the great powers does not auger well for safe space operations as has been borne out in the Ukraine conflict. Despite India's demonstration of Anti-Satellite Kinetic Kill capability in 2019, it remains firm in its stand against the Weaponisation of Space. It is feared that the space domain will become the high ground to be seized and either commanded or to be denied to the potential adversaries.

In 2008, Russia and China had proposed the Prevention of Placement of Weapons in Outer Space, the threat or use of force against outer space objects (PPWT), however, the USA interpreted it as unverifiable, inadequate inconsistent and advantageous to its promoters. Even the revised Draft of PPWT in 2014 did not allay the misgivings and suspicions of many including the USA. The Transparency and Confidence Building Measures (TCBMs) in outer space Activities in 2011 have been abstained by the USA, citing the mention of PPWT in the resolution thus revealing the difficulties in achieving consensus on space security.

The US DoD had in July 2021[14] initiated the process for formulating the US response for 'responsible behaviour in Space' acknowledging the 'increased risks of collisions as well as miscalculations and misunderstandings.'

India's view on Space Security has been consistent—'India has no intention of entering into an arms race in outer space. We have always maintained that space must be used only for peaceful purposes. We are against the weaponisation of Outer Space and support international efforts to reinforce the safety and security of space-based assets'.[15]

South Asia Satellite

In 2014 during the SAARC summit, India offered a South Asian Satellite (GSAT 09) for all SAARC member states as a gift, subsequently, Pakistan opted out of the arrangements as it had already ordered its requirements through China. After necessary frequency coordination and other

arrangements, the satellite was launched on 5 May 2017 on the GSLV MK II-F09 as communication and meteorological satellite with 12 Ku Band Transponders to be shared among the six beneficiary countries i.e. Bangladesh, Bhutan, Sri Lanka, Maldives, Nepal and Afghanistan alongside India.

PM Modi[16] described it as a historic moment which opened new horizons of engagement and that it would meet the aspirations of economic progress of more than 1.5 billion people in our region. Its applications include tele-education, telemedicine, intergovernmental networks, emergency communication for disaster situations and DTH services. In 2019, PM Modi inaugurated the ground space station in Thimpu, Bhutan which was set up by Bangalore based Alpha Design Ltd.,[17] the scope involved setting up of a ground Hub station at Thimpu and 110 fixed VSAT terminals and 50 receive-only terminals and 05 portable terminals.

Emerging Space Market in South Asia

Table 1: Existing Space Assets in South Asia less India

S. No.	Country	Space Agency/ Company	Satellite	Remarks
1.	Bhutan	Information and Communications Ministry	Bhutan 1 INS 2B	BIRD (Japan Cubesat Kyushu Institute of Technology) Indo-Bhutan Joint Satl (planned)
2.	Bangladesh	Bangladesh Satellite Company Ltd	Bangabandhu 1 Bangabandhu 2 BRAC Oonesha	Communication Earth Observation (planned) BIRD (Japan Cubesat Kyushu Institute of Technology)

3.	Nepal	Nepal Telecommunication Authority	Nepal Sat 1 Sanosat 1	BIRD (Japan Cubesat Kyushu Institute of Technology) Pico satellite (students)
4.	Afghanistan	Ministry of Communication and Information	Afghansat 1	Leased from EUTELSAT in Jan 14
5.	Sri Lanka	Supremesat Pvt Ltd	Supremesat 1 Supremesat 2 Raavna 1	Leased part payload from CHINASAT 12 Planned BIRD (Japan Cubesat Kyushu Institute of Technology)
6.	Pakistan	Suparco	Paksat 1R Paksat MM1 Paktes 1A PRSS 1 Badr A, B 1 CUBE	Communication (China 2011) Two Satellite Ground Control Stations at Karachi and Lahore Leased from ASIASAT4 (Hong Kong 2003) EO medium resolution, 1B under development EO High Resolution (China 2018) Micro satl UK Pico Satl (Institute of Space Technology Islamabad)

Source: Annotated by the author (Gunters space page[18])

Need for Smart Space-based Services for Security and Governance

Geospatial technologies, remote sensing, satellite communication and navigation systems are providing many new ways for effective management of natural resources in the region. This has resulted in enabling variety of data and information products for societal benefits and unique people-centric space-based services.

Indian Remote Sensing Satellite constellation has many areas of space applications[19] such as Agricultural Crops Inventory, Water Resources Information System, Potential Fishing Zones, Ocean State Forecasts, Inventory & Monitoring of Glacial Lakes/Water Bodies, Location-based Services using NavIC constellation, Disaster Management Support Programme.

GeoMGNREGA. One example from more than 250 applications provided by ISRO to the Government is GeoMGNREGA.[20] MGNREGA was enacted to enhance the job security of rural people. Under this scheme, assets at the village level are created across the country related to water harvesting, drought relief, flood control activities, and sanitation at the village level. Satellite-derived and Location-based services are being utilised for planning and monitoring of nearly 3.3 crore assets annually (December 2018) through the use of mobile-based geo-tagging enabling accountability, transparency and financial effectiveness.

Similarly, smart border management and maritime domain awareness have a critical space segment. The Maritime Sea Lanes are only going to get busier and so does the need for cooperation against piracy and non-state actors in the region. A different interpretation of the UNCLOS also poses challenges to the South Asian Marine States.

The need for data connectivity is only going to explode, and the LEO based digital connectivity is likely to be fully functional in a year in India, some of the players include Airtel ONEWEB, STARLINK, JIO Space Technology and SES Luxemburg and NELCO ex TATA are planning

affordable broadband services for a pan India rollout and the same has the potential to be extended to South Asia.

M/S Pixel Ltd is planning to launch two of its hyperspectral satellites later this year and the constellation of 36 satellites is likely to be online in another year, this enables a huge jump in remote sensing capability for South Asia.

Indian Space Military Diplomacy: Way Ahead

India needs to build upon its past umbilical connections to the regional militaries and build upon the goodwill. There is a need to deepen the security cooperation through space diplomacy by capacity building and offering space-based solutions for their Earth Observation and Satellite Communications needs**.** Besides high-level defence contacts, India also conducts annual exercises with Bangladesh, Nepal, Sri Lanka and with the QUAD-Malabar Exercises, now it only needs to incorporate the space enabled operations into these exercises showcasing smart operational planning, control and improved maritime domain awareness. India is the top training destination for officers of South Asia nations and the military education exchanges can now be expanded to cover the space domain and also to build lasting collaboration with other nations.

The defence exports in India have witnessed an increase to Rs 9,000 crore in 2021[21] and it now aspires for an ambitious target of export turnover of $5 billion by 2024, the defence exports are being sent to 84 countries and SIPRI holds India in the list of top 25 exporters in the world. The Defence Attaches now are the face of Military Diplomacy and now they are being provided with monetary support to expand the defence exports. A list of 152 defence items that are available to friendly nations at competitive prices has already been promulgated. Now as the Space sector booms in India, there is a huge potential for inclusion of space-based services, addition of the strategic space domain capacity building and infrastructure either as commercial contracts or as a line of

credit utilisation or grants can also be explored. The exploitation of space assets will lead to a secure and prosperous neighbourhood for India.

The Defence Space Agency needs to ideate the security and border management dimension of the space cooperation for South Asia, but it's likely that this capacity utilisation will be dual-use and hence a whole government approach including smart governance solution cooperation is recommended. There will also be a requirement to brief our Defence Attaches (DAs) on their own space capability sharing and capacity building initiatives for possible international cooperation. There is a need to identify various government users and enterprise customers who will use these services in the partner country.

The annual seminars conducted by the DSA should incorporate the DAs of friendly countries to enable showcasing our space capability. The strategic community and think tanks also need to debate on India's stand for future space operations including space traffic management. A roadmap for space cooperation for security and smart governance with South Asian Nations is given below.

In the *short term*, immediate needs of security can be met by procurement of high-resolution imagery and hiring of bandwidth for communications from ISRO which already has 200 transponders capacity and emerging space mobile connectivity in the digital domain.

In the *midterm*, dedicated satellites can be launched by ISRO for exclusive use of nations for their communication, remote sensing, disaster management and student capacity building needs. There is a need to identify additional vacancies in our space institutions which can be sponsored through the MEAs programmes.

Over the *long term*, the nations can develop ground segment and network infrastructure to share satellite resources with respective user agencies, develop a facility for storing various imagery resources and dissemination of the same to various user agencies for smart governance solutions.

Conclusion

Adopting modern space technology can immediately smoothen the security/border management, maritime domain awareness and ensure better connectivity and trade opportunities in South Asia as India moves towards a multipolar world and as a rising world economic powerhouse. India's growth is tethered to a secure and well-governed South Asia and the emerging space market should be exploited to improve the security and cooperation in South Asia. The improved space cooperation will underscore the ability of the Indian Union to grow stronger through better connectivity and smooth trade and people to people movement. India should enable better security, border management/maritime domain awareness and governance solutions through space applications as it has also benefited from international cooperation in the past and now India can reclaim its seat on the world affairs by utilising its existing and emerging capabilities in the space sector and grow its space commerce to $25 billion by 2025.

Notes

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