



SPACE

SUMMARY

India's space program stands out as one of the most cost-effective in the world. India has earned worldwide recognition for launching lunar probes, building satellites, ferrying foreign satellites up and has even succeeded in reaching Mars. ¹

India has two operational launch vehicles: Geosynchronous Satellite Launch Vehicle (GSLV) and Polar Satellite Launch Vehicle (PSLV). The number of launches undertaken by Indian Space Research Organisation (ISRO) during the last five years i.e. from 2015 to 2019 is as follows: ²

2015: 5 launches (4 PSLV & 1 GSLV)

2016: 9 launches (6 PSLV, 1 GSLV, 1 Scramjet Engine TD & 1 RLV TD)

2017: 5 launches (3 PSLV & 2 GSLV)

2018: 7 launches (4 PSLV & 3 GSLV)

2019: 6 launches (5 PSLV & 1 GSLV)

Till December 2019, a total of 319 foreign satellites from 33 countries have been successfully launched onboard Polar Satellite Launch Vehicles (PSLVs) by ISRO. ³

REASONS TO INVEST

India's space programme has attracted global attention for its accelerated rate of development, with a critical appreciation for the following extraordinary explorations: ¹

Mars Orbiter Mission (MOM) or Mangalyaan

Chandrayaan-2 Mission (India's 2nd mission to the moon)

AstroSat Mission (India's 1st observatory mission for astronomy)

Aditya-L1 Mission (India's 1st solar observatory in space)

ISRO has forged a strong relationship with many industrial enterprises, both in the public and private sector, to implement its space projects.

With the ISRO undertaking the development of cutting-edge technologies and interplanetary exploratory missions, there is a tremendous scope in contributions to the realization of operational missions and new areas such as satellite navigation.

The Union Cabinet of India has approved reforms in the Space sector which will boost private sector participation in the entire range of space activities. The Indian National Space Promotion and Authorization Centre (IN-SPACe) will provide a level playing field for private companies to use Indian space infrastructure and also handhold, promote and guide the private industries in space activities through encouraging policies and a friendly regulatory environment. Such a thrust from the Government of India is intended to create investment opportunities for private companies in the Space sector in India. ⁴

RECENT ANNOUNCEMENTS

30th December 2020: Hon'ble PM, Shri Narendra Modi approved MoU between the Government of the Republic of India and the Royal Government of Bhutan on Cooperation to pursue cooperation in remote sensing of the earth; satellite communication and satellite based navigation.

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23rd December 2020: Hon'ble PM Shri Narendra Modi, has given its approval for signing the revised Air Services Agreement between India and Philippines. This will provide enhanced and seamless connectivity with a potential to spur greater trade, investment, tourism and cultural exchanges between the two countries.

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23rd December 2020: Hon'ble PM Shri Narendra Modi, has given its approval for signing the revised Air Services Agreement between India and Afghanistan which will enhance the potential to spur greater trade, investment, tourism and cultural exchanges between the two countries.

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14th December 2020: Hon'ble PM Shri Narendra Modi interacted with key industries, startups and academia from the Space sector to encourage their participation in space activities. PM expresses hope that the country would soon become the manufacturing hub of space assets.

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09th November 2020: Indian astronomers collaborated with Nobel laureates on the Thirty Meter Telescope Project. The Thirty-meter telescope (TMT) project is an international partnership between CalTech, Universities of California, Canada, Japan, China, and India.

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STATISTICS

Space activities in the country were initiated with the setting up of the Indian National Committee for Space Research (INCOSPAR) in 1962. The Indian Space Research Organisation, better known as ISRO was established in August 1969.¹

The Government of India constituted the Space Commission and established the Department of Space (DOS) in June 1972 and ISRO was bought under DOS in September 1972.¹

India's first space observatory, ASTROSAT has successfully completed four years in space and has more than 900 registered users from 24 countries.⁵

India has launched several space missions and explorations. The country has to its credit - 109 spacecraft missions, 77 launch missions, 10 student satellites, 2 Re-entry missions and 319 foreign satellites.³

India's most powerful launch vehicle, GSLV-MK III capable of launching 4 tons of satellites into Geosynchronous Transfer Orbit (GTO) was successfully launched in July, 2019.⁵

India's first inter-planetary mission to "Mars Orbiter Mission (MOM)" successfully completed 5 years in the orbit of Mars in September 2019.⁵

GROWTH DRIVERS

THE INDIAN SPACE RESEARCH ORGANISATION (ISRO)

The prime objective of ISRO is to develop space technology and its application to various national tasks.¹

SPACE COMMERCE:

Antrix Corporation Limited, the commercial and marketing arm of the Department of Space has undertaken many initiatives for the global marketing of space products and services. Antrix has continued to expand its market base ever since its inception in 1992.¹

New Space India Limited (NSIL) is responsible for enabling industries in India to upgrade high-tech manufacturing bases for the Indian Space Programme.¹

LAUNCH VEHICLES

Satellite Launch Vehicle (SLV): SLV's first successful launch took place in 1980; SLV-3 from Sriharikota Range (SHAR).⁹

Augmented Satellite Launch Vehicle (ASLV): Designed to augment payload capacity, the first launch test of ASLV was held in 1987, and three others followed in 1988, 1992 and 1994.¹⁰

Polar Satellite Launch Vehicle (PSLV): The third generation launch vehicle of India, PSLV was successfully launched in 1994 for the first time.¹¹

Geosynchronous Satellite Launch Vehicle (GSLV): The largest launch vehicle developed by India, GSLV was first launched in 2001.¹²

SPACE SCIENCE PROGRAMME

The Department of Space implements space programs and promotes research activities at the following facilities:¹

- Physical Research Laboratory (PRL)
- National Atmospheric Research Laboratory (NARL)
- North Eastern Space Applications Centre (NE-SAG)
- Semi-Conductor Laboratory (SCL)
- Indian Institute of Space Science and Technology (IIST)

Some renowned space research and development centres in India are as given below:¹

- Vikram Sarabhai Space Centre (VSSC), Thiruvananthapuram
- U R Rao Satellite Centre (URSC), Bengaluru
- Satish Dhawan Space Centre (SDSC) SHAR, Sriharikota
- Liquid Propulsion Systems Centre (LPSC), Thiruvananthapuram and Karnataka
- Space Applications Centre (SAC), Ahmedabad
- Human Space Flight Centre (HSFC), Karnataka
- National Remote Sensing Centre (NRSC), Hyderabad
- ISRO Propulsion Complex (IPRC), Mahendragiri

FDI POLICY

Foreign Direct Investment (FDI) up to 100% is allowed in satellites-establishment and operation, subject to the sectoral guidelines of the Department of Space/ISRO, under the government route.⁷

SECTOR POLICY

SATELLITE COMMUNICATION POLICY

A policy framework for Satellite Communication in India had been approved by Government in 1997. The norms, guidelines and procedures for implementation of the Policy Framework for Satellite Communications in India, were approved by the government in the year 2000. The aim of the policy is to build capability and develop the country in the area of satellites. To fulfill the purpose, the INSAT program plays an important role. It is managed by the INSAT Coordination Committee (ICC) with technical support from its Technical Advisory Group (TAG).⁸

REMOTE SENSING

In 2011, India adopted the Remote Sensing Data (RSD) Policy. The nodal agency for all actions under the policy is Department of Space (DoS) of the Government of India. The National Remote Sensing Centre (NRSC) of ISRO/ DOS is consigned with the authority to obtain and circulate all satellite remote sensing data in India, both from Indian and foreign satellites. Antrix Corporation Ltd. (of DOS) will be accountable for grant of license for acquisition/ distribution of IRS data outside India.⁸

DRAFT SPACECOM POLICY- 2020

Department of Space published “Draft- Spacecom Policy-2020”. The policy aims to meet the growing demand of space based communication requirements of the nation. This will boost Government’s initiatives towards Self Reliant India (Aatmanirbhar Bharat) that will drive focus on “ease of doing business” and encourage healthy competitiveness in the growth of the national economy.¹³

INTERNATIONAL COOPERATION

India is associated with the United Nations Office for Outer Space Affairs (UNOOSA) and is also a member of the United Nations Committee on Peaceful Uses of Outer Space (UN-COPUOS).¹

ISRO continues to share its facilities, expertise and services in the application of space technology through various courses offered by the Institute of Remote Sensing (IIRS) and United Nations (UN) affiliated Centre for Space Science and Technology Education in Asia and the Pacific (CSSTE-AP) at Dehradun. As of now, there are more than 1100 beneficiaries from 52 countries.¹

ISRO is also a participant of the various conventions and conferences organized by the following globally acclaimed space organizations:¹

- International Astronautical Federation (IAF)
- International Academy of Astronautics (IAA)
- International Institute of Space Law (IISL)
- Committee on Earth Observation Satellites (CEOS)
- International Society for Photogrammetry and Remote Sensing (ISPRS)
- Coordination Group on Meteorological Satellites (CGMS)
- International Committee for Global Navigation Satellite Systems (ICG)
- Committee on Space Research (COSPAR)
- International Space Exploration Coordination Group (ISECG)
- Inter-Agency Space Debris Coordination Committee (IADC)

India has signed various cooperative agreements and Memoranda of Understanding (MoU) with other countries and organizations as an initiative to expand its international outreach. The areas of co-operation are mainly concerned with remote sensing of the earth, airborne synthetic aperture radar, maritime domain awareness, satellite communication, launch services, space exploration, space law and capacity building. Some important agreements are listed below:¹

- IA between ISRO and National Aeronautics and Space Administration (NASA)
- IA between ISRO and Japan Aerospace Exploration Agency (JAXA)
- MoU between India and Tunisia
- Implementing Arrangement (IA) between ISRO and Korea Aerospace Research Institute for cooperation
- IA between ISRO and German Aerospace Center (DLR)
- Statement of Intent between ISRO and Bahrain’s National Space Science Agency
- IA between ISRO and National Centre for Space Studies (CNES), France
- Agreement between India and Mongolia

PROJECTS

Mars Orbiter Mission (Mangalyaan)

India’s first interplanetary mission to planet Mars with an orbiter craft designed to orbit Mars was launched successfully on 5th November 2013 by PSLV-C25 from Sriharikota. Beyond the designed mission life of six months, the orbiter completed 5 years in its orbit on 24th September 2019.¹

Chandrayaan-2

India’s second moon mission, Chandrayaan 2 was launched on 22nd July 2019. It was inserted in the Lunar Transfer Trajectory on 14th August 2019. Launched with an aim to expand lunar scientific knowledge through detailed studies of surface chemical composition, topography, thermo-physical characteristics and mineralogy, the orbiter successfully completed more than 4400 orbits around the Moon.^{1,6}

Gaganyaan – Human Space Flight Programme

The Gaganyaan project is being primarily executed by Human Space Flight Centre (HSFC), which was constituted in January 2019 in ISRO to implement the Human Space Flight Programme. The objective of the Gaganyaan project is to demonstrate human space flight capability to Low Earth orbit (LEO) with 3 crew members for 5-7 days in orbit and then safely recover them after the mission. The first manned mission to space is scheduled in December 2021.¹

FOREIGN SATELLITES

ISRO has successfully launched 50 foreign satellites from 7 countries for commercial purposes during the year 2019.⁵

AGENCIES

- Department of Space, Indian Space Research Organization
- Vikram Sarabhai Space Centre

KEY ACHIEVEMENTS

On October 12, 2020, a Memorandum of Understanding (MoU) was signed between the Department Of Space (DOS) and NewSpace India Limited (NSIL). MoU will enable NSIL to transfer technologies to the industry.¹⁴

Indian Space Research Organisation (ISRO) and India’s space industry successfully launched PSLV-C49/EOS-01 Mission. Nine satellites, including four each from the US and Luxembourg and one from Lithuania, was also launched in the Mission.

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