



GLIMPSES

OF INDIAN SPACE PROGRAMME

Government of India established the Department of Space in 1972 to promote development and application of space science and technology for socio-economic benefits. Indian Space Research Organisation (ISRO) is the primary agency under the Department of Space for executing space programmes. During the seventies, India undertook demonstration of space applications for communication, broadcasting and remote sensing; designed and built experimental satellites – Aryabhata, Bhaskara, APPLE and Rohini – and experimental Satellite Launch Vehicles – SLV-3 and ASLV. Today, India has established space systems that form an important element of the national infrastructure.



National Systems using Space Technology

INSAT

- Telecommunications
- Broadcasting (TV, Radio)
- Business Communication
- Mobile Communication
- Telemedicine
- Search & Rescue
- Satellite Navigation
- Meteorology

IRS

- Natural Resources Management
- Natural Resources Information System
 - Water
 - Forest
 - Crop
 - Land
 - Minerals
 - Environment
 - Ocean

Launch Vehicles

GSLV

PSLV

RESOURCESAT-1

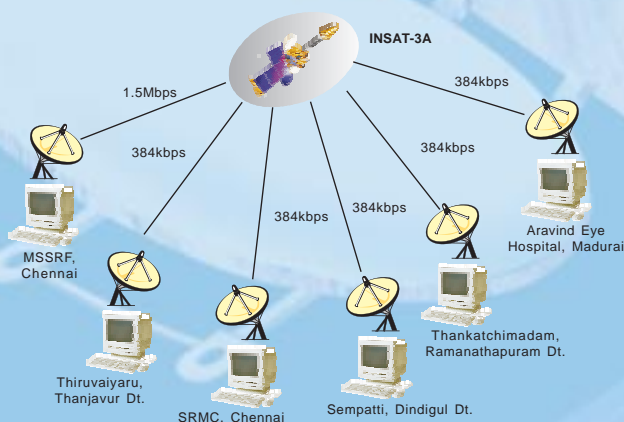
INSAT-3A

- Disaster Management Support
- Village Resource Centres

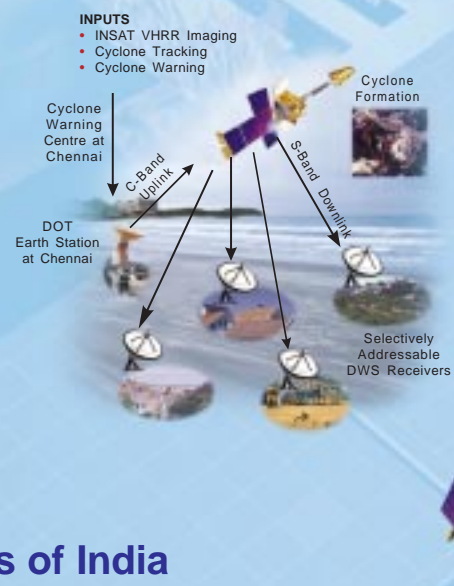
Indian National Satellite (INSAT) System

Commissioned in 1983, INSAT is a multipurpose satellite system for telecommunications, television broadcasting, meteorology, disaster warning and search and rescue. Besides telecommunications and regular broadcasting services, INSAT is widely used for interactive education, developmental communication and telemedicine. Meteorological imaging and direct-to-community broadcast capabilities of INSAT help in issuing warnings on impending cyclones. INSAT also carries transponders dedicated to search and rescue operations as part of international COSPAS/SARSAT programme.

ISRO-MSSRF Village Resource Centres (VRC) Network



Disaster Warning System



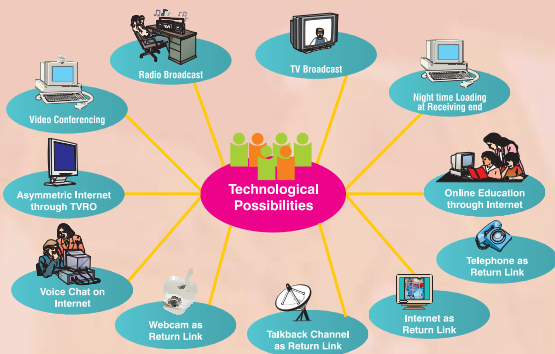
Geostationary Satellites of India



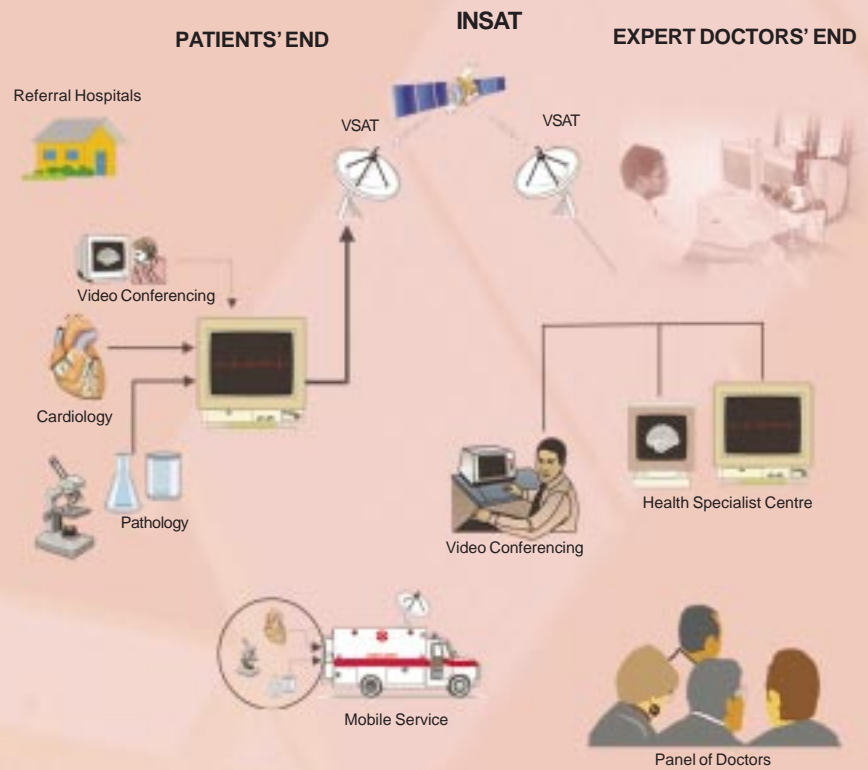
Tele-education



Uses of EDUSAT



Telemedicine



Indian Remote Sensing Satellite (IRS) System



Commissioned in 1988, India now has the world's largest constellation of remote sensing satellites. The system offers space-based data in a range of spectral bands, spatial resolutions and swaths. The data is used for several applications covering agriculture, water resources, urban development, mineral prospecting, environment, forestry, drought and flood forecasting, ocean resources and disaster management.

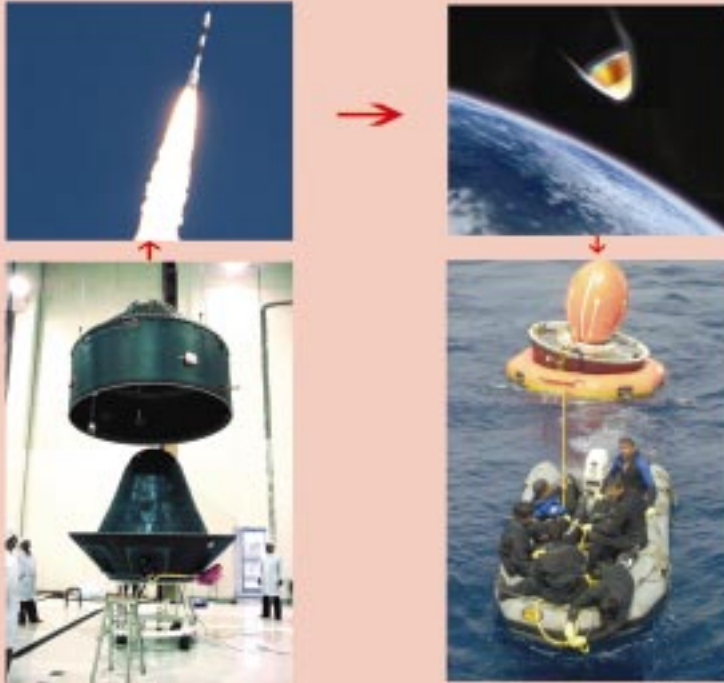


Remote Sensing Satellites of India



Space capsule Recovery Experiment (SRE-1)

Space capsule Recovery Experiment (SRE-1) is a 550 kg capsule that demonstrated a host of technologies for orbiting a capsule to perform experiments in microgravity conditions of space, and after completion of the experiments, de-orbit and recover the capsule. All these form the basis for reusable launch vehicles. SRE-1 was launched on January 10, 2007 by PSLV-C7 and twelve days later was successfully recovered over Bay of Bengal.



Sounding Rockets



A variety of Rohini sounding rockets have been developed by India for conducting scientific and technological experiments.

Launch Vehicles

India has developed and commissioned Polar Satellite Launch Vehicle (PSLV) and Geosynchronous Satellite Launch Vehicle (GSLV). PSLV can launch 1600 kg class remote sensing satellites into a 620 km polar Sun Synchronous Orbit. It can also place a satellite weighing about 1050 kg in Geosynchronous Transfer Orbit (GTO) or a 3500 kg class satellite in Low Earth Orbit. GSLV is capable of launching 2000 kg class satellites into GTO. GSLV Mark-III, to place 4000 kg class satellites in GTO, is under development.

PSLV

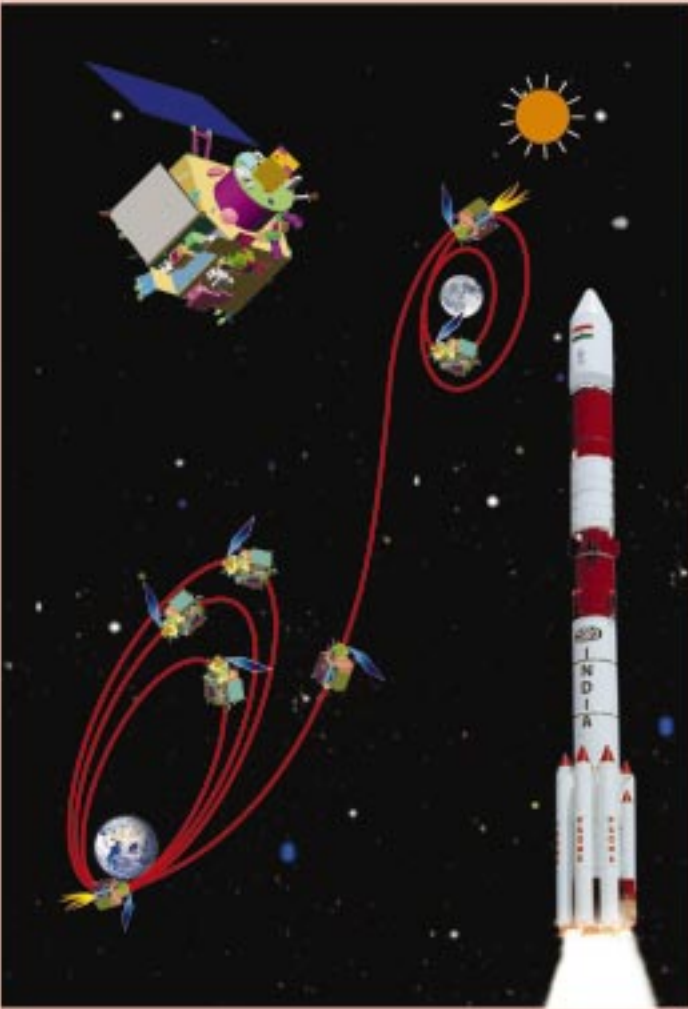


GSLV-Mk-I



GSLV-Mk-III





Chandrayaan-1 Mission

Space Sciences



India has flown Gamma-Ray and Retarding Potential Analyser payloads on two of its Stretched Rohini Satellites launched in 1992 and 1994. IRS-P3, launched in 1996, carried an X-ray astronomy payload. Chandrayaan-1, which envisages orbiting a spacecraft at a height of 100 km in polar orbit around the moon for physical and chemical mapping of the moon's surface, is planned in 2008. An exclusive astronomical satellite, ASTROSAT, is also planned. Several ground-based facilities for space sciences, including a Mesosphere Stratosphere Troposphere (MST) Radar, have been set up in India.

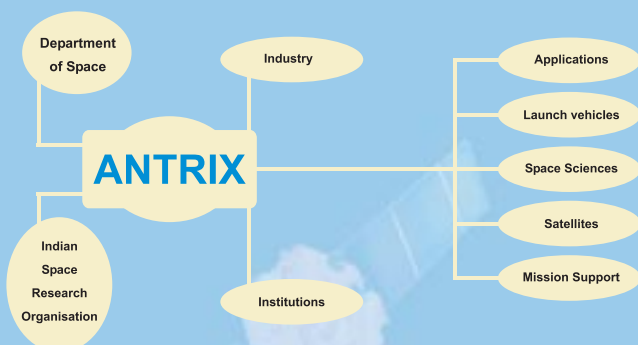
Infrastructure for Space Development

India has established a strong infrastructure for executing its space programme. They include facilities for the development of satellites and launch vehicles and their testing; launch infrastructure for sounding rockets and satellite launch vehicles; telemetry, tracking and command network; data reception and processing systems for remote sensing. A number of academic and research institutions as well as industries participate in the Indian Space Programme. Several Indian industries have the expertise to undertake sophisticated jobs required for space systems.



Second Launch Pad at Satish Dhawan Space Centre SHAR, Sriharikota

Space Services from India



Antrix Corporation of the Department of Space markets the space services and hardware. They include enabling Indian Remote Sensing satellite data reception, launch services, lease of transponders on INSAT and TTC support.

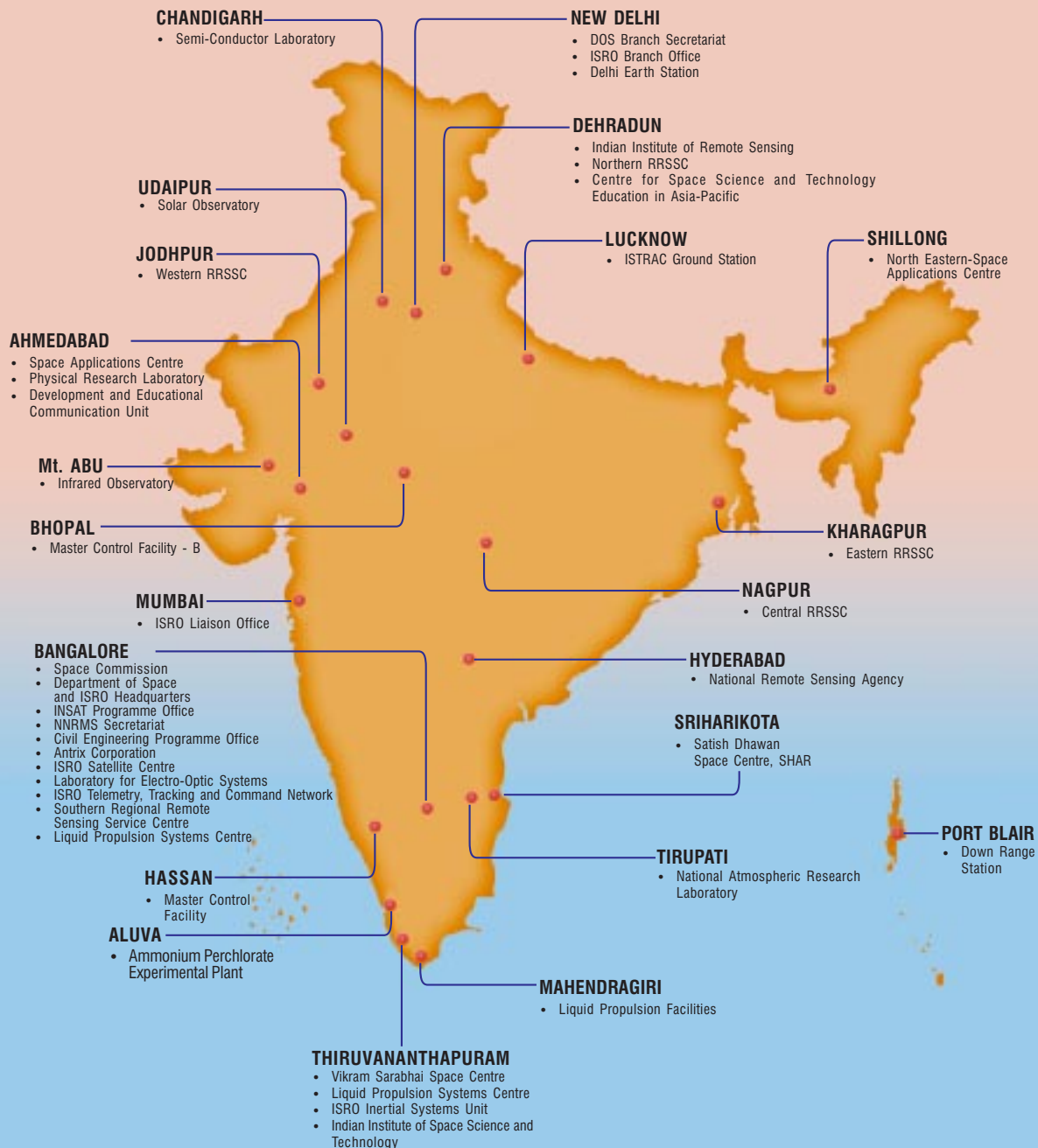
International Co-operation

International co-operation has been the hallmark of Indian space programme. India participates in major space fora including the UN, IAF, COSPAR and CEOS. India has set up the Centre for Space Science and Technology Education in Asia and the Pacific (CSSTE-AP) which is sponsored by the United Nations. India offers training in space applications to personnel from developing countries under the programme Sharing of Experience in Space (SHARES). Chandrayaan-1, a 1300 kg unmanned spacecraft built by ISRO for exploring the moon, will carry 11 scientific instruments from India, the United States, the European Space Agency and Bulgaria. ISRO and the French Space Agency CNES have undertaken a joint atmospheric satellite mission Megha-Tropiques to be launched in 2009-10.



Artist's view of Megha-Tropiques

Space Centres in India



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