Agenda Item – 14: Space Exploration and Innovation

Mr. Chairman and Distinguished delegates

India's space research programme, which started way back in 1960s with the probing of the Earth's atmosphere using sounding rockets from the Thumba Equatorial Rocket Launching Station (TERLS), has evolved to satellite, lander and rover based experiments to explore the solar system. The open scientific problems of the solar system planets and natural satellites motivated ISRO's Chandrayaan-1, Chandrayaan-2 and the Mars Orbiter Missions.

Mr. Chairman

The Mars Orbiter Mission, or MOM, India's first interplanetary mission to Mars has completed six years in its orbit. Among several intriguing results, studies based on MOM of ISRO and the MAVEN mission of NASA have shown significant variability of the Martian exosphere. The Mars Orbiter Mission, apart from studying the composition of the Martian exosphere, also detected the presence of suprathermal Argon-40 in the Martian exosphere, which provides clue on the outstanding problem of the loss of the Martian atmosphere.

Mr. Chairman

Astrosat, India's first multi-wavelength observatory in space, has successfully completed five years in orbit and continues to provide intriguing scientific information on astrophysical sources. Astrosat has produced more than 150 refereed publications in the last two years, with a user base of more than 1600, with a sizeable fraction from the international scientific community spreading across 48 countries. The observation time of Astrosat payloads is allotted based on the merit of the proposals received from national and international researchers through periodic Announcements of Opportunity by ISRO.

Astrosat observations have led to several discoveries and exciting results like discovery of UV photons from earliest galaxies, discovery of phase-resolved X-ray polarization in Crab pulsar and X-ray polarisation from several gamma ray bursts and contributed significantly towards solving of the puzzle of a cosmic source being bright in both infra-red and UV as due to hidden white dwarf.

Astrosat observations have also led to the detection of evolution of a gamma ray source stuck in a very long flaring state exhibiting dozens of states of activity and also to the detection of time-varying prompt emission polarization in X-rays in several Gamma Ray Bursts helping in constraining Gamma Ray Burst models.

Mr. Chairman

Chandrayaan-2, India's second lunar mission, launched in 2019, is studying the Moon from a polar orbiter platform at about 100 km altitude from the lunar surface.

There are eight scientific payloads including imagers onboard Chandrayaan-2, to study the surface topography, mineralogy, as well as the exospheric composition and its variability. Chandrayaan-2 is providing the sharpest images of the lunar surface with 25 cm resolution. The scientific results are being published in peer-reviewed journals. A few significant results from Chandrayaan-2 mission include first remote detection of minor elements Chromium and Manganese, first map of Sodium distribution on the lunar surface, first global coverage of Oxygen line at 12.5 km x 12.5 km spatial resolution; first observations of the spatio-temporal variation of Argon 40 signals from the low- and mid- latitude lunar exosphere, to name a few. In addition to the lunar observations, the Solar X Ray monitor in Chandrayaan-2 has studied the elemental abundances in the quiescent corona of the Sun, and detected Sub-A Class microflares outside active regions, which throw light to understand the Coronal Heating Problem of the Sun.

The data from the Chandrayaan-2 orbiter payloads are made available through the Indian Space Science Data Centre (ISSDC).

Mr. Chairman

A Series of planetary science missions are in preparatory phase, which include the Chandrayaan-3 mission consisting of Lander and a Rover to study the lunar surface, that is scheduled for 2022 launch. Aditya-L1 mission, India's first space based solar mission, to study various processes of corona, chromosphere and the photosphere from the Sun-Earth first Lagrangian point is scheduled for launch in next year.

XpoSat, the first dedicated satellite for X-ray Polarization measurement in Cosmic X-rays will study selected bright known sources in the universe is also targeted for launch in 2022.

A series of missions are under study and approval phases, including the ISRO-JAXA Lunar Polar Exploration (LUPEX) mission; mission to Venus; a follow-up mission to Mars; mission to characterize the atmosphere of selected known exoplanets; a twin satellite system for studying the aeronomy of Earth's upper atmosphere; future astronomy missions, as a follow up of the Astrosat mission.

Mr Chairman,

The Indian delegation hereby submits the important steps taken to work closely with the global community in the area of space science and exploration. We look forward to an exciting era of collaborative pursuit of science from the vantage point of space.

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