Space Weather

Madam Chair and Distinguished delegates,

The Indian space agency ISRO and the national academia consider the domain of Space Weather studies crucial not just for achieving an understanding of the Sun-Earth connection, but also for assessing its impacts on the national space assets. Thus, in India, the study of space weather involves examining Solar flares, Coronal Mass Ejections, associated magnetic fields, their effects as geomagnetic storms, and their impact on Earth's upper atmosphere/ionosphere through observation, modelling, and simulation. The Indian delegation takes this opportunity to provide updates on developments and activities related to Space Weather and its effects on the Earth's atmosphere.

Madam Chair,

In pursuit of this goal, India's Aditya-L1 mission was successfully launched on September 2, 2023, aboard PSLV-C57. The spacecraft is positioned at the first Sun-Earth Lagrange point equipped with a suite of instruments for measuring photons (visible and UV), particles (solar wind plasma), and the interplanetary magnetic field. *En route* to the halo orbit about the Sun-Earth L1 point, a few scientific observations were made on high energy X-Ray emission from the Sun, energy spectrum of the solar wind, solar electrons, as well as the first-ever UV imaging of the entire solar disc. Beyond investigating the transmission of solar disturbances, this mission aims to enhance our understanding of solar physics, with a particular focus on examining the origin of the solar corona within the range of 1.05 times the solar radius to 3 solar radii. Aditya-L1, featuring simultaneous spectroscopy and imaging capabilities, is designed as a space-based solar observatory, with a nominal life-time of five years.

The Aditya L1 payloads are anticipated to yield vital insights into key solar phenomena, such as coronal heating, coronal mass ejections, pre-flare and flare activities, as well as the characteristics and dynamics of space weather. Additionally, the studies will contribute to a deeper understanding of the propagation of particles and fields in space.

The endeavour is national effort wherein scientific instruments are developed by Centres across ISRO, along with other institutes within the country such as Indian Institute of Astrophysics (IIA), Bangalore and Inter University Centre for Astronomy and Astrophysics (IUCAA), Pune.

Madam Chair,

In addition to space-based observations of solar disturbances from the Aditya-L1 platform, India is poised to conduct coordinated ground-based observations through various observatories and networks. These endeavours encompass the examination of Earth's ionospheric responses to solar disturbances, fluctuations in the geomagnetic field, and multi-wavelength observations of the Sun, among others. The Multi Application Solar Telescope (MAST) and the Global Oscillation Network Group (GONG) node at the Physical Research Observatory will provide complementary observations to Aditya-L1. The Indian Network for Space Weather Impact Monitoring (INSWIM) network will contribute measurements of ionospheric parameters across strategically chosen locations in India to complement observations on solar disturbances and geomagnetic variations. This synchronized approach, combining space and ground-based observations of the Sun and Earth's upper atmosphere, coupled with modelling and simulation, represents a significant stride toward achieving a comprehensive understanding of the physics and practical implications of space weather.

Madam Chair,

These collaborative initiatives align with the increasing solar activity, coinciding with the anticipated peak of the 25th solar cycle in 2025. Given the projected five-year lifespan of Aditya-L1, India aims to investigate the Sun-Earth connection and space weather across a broad range of solar activity during this period.

Thank you, Madam Chair and distinguished delegates.