Annual Report
2024-25

INDIAN INSTITUTE OF GEOMAGNETISM

New Panvel, Navi Mumbai.

Indian Institute of Geomagnetism

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AUTONOMOUS RESEARCH INSTITUTE
UNDER
DEPARTMENT OF SCIENCE AND TECHNOLOGY
GOVERNMENT OF INDIA

Cover Page:

The 'Balloon Experiment on the Electrodynamics of Near Space' (BEENS) carried out on the night of January 17-18, 2025, during the pre-midnight to early morning hours, at TIFR Balloon Facility, Hyderabad. The balloon reached a float altitude of ~33 km. Inset figure indicates a double probe configuration with four orthogonal booms- two positioned at the top of the gondola (central payload structure) and two at the bottom. This configuration enabled two sets of simultaneous measurements of horizontal and vertical electric field components.

INDIAN INSTITUTE OF GEOMAGNETISM

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From the Director's Desk…..

The Indian Institute of Geomagnetism (IIG) has, over decades, remained steadfast in its mission to advance fundamental and applied research in geomagnetism and allied geosciences, contributing significantly to India's scientific landscape. This Annual Report for the year 2024-2025 is not just an account of milestones reached but a testament to the Institute's unwavering commitment to scientific excellence, technological innovation, and national service through Earth and Space Science research.

As the world faces pressing challenges, from the impacts of space weather on critical infrastructure to the hazards of environmental degradation and natural disasters, IIG's multi-faceted research remains more relevant than ever. Its pioneering efforts continue to bridge gaps in our understanding of the geosphere, atmosphere, ionosphere, magnetosphere, and the dynamic processes that connect them.

This year, the Institute has reinforced its leadership with notable scientific, technological, and outreach achievements that resonate deeply with national development priorities and global scientific frontiers. The Institute's research programmes span the entire spectrum of geomagnetism, plasma physics, ionospheric physics, solid Earth processes, environmental magnetism, paleomagnetism, seismology, and environmental sustainability.

At the heart of IIG's legacy lies its unparalleled contribution to geomagnetic data collection and analysis. Our network of magnetic observatories across India continues to provide continuous, high-quality datasets that are vital for understanding both long-term secular variations and short-term perturbations of the Earth's magnetic field. These observatories, equipped with indigenously developed proton precession magnetometers, Overhauser magnetometers, and fluxgate instruments, have once again demonstrated the Institute's ability to sustain robust long-term observations, despite challenges ranging from instrument failures to environmental extremes.

A highlight of this year was the revival of the Hanle observatory in Ladakh, which has begun providing vital data from a unique high-altitude location, enhancing our spatial coverage of India's geomagnetic field. Our observatories at Alibag and Jaipur continue to contribute to INTERMAGNET, the international consortium of geomagnetic observatories, enabling near real-time data sharing with the global scientific community. These contributions reinforce India's presence in the international framework of geomagnetic monitoring.

Equally significant was the successful development and in-house fabrication of India's first Overhauser Magnetometer, a pioneering achievement in scalar magnetometry. With its exceptional resolution and stability, this innovation not only strengthens our research capacity on the ground but also positions the Institute as a future contributor to space-borne missions. Its integration into the forthcoming PEERS (Probing the Equatorial Electrojet using Rocket Sounding) mission aboard the RH300 sounding rocket will serve as a major milestone in translating laboratory innovation into space-ready instrumentation.

Our active participation in the Indian Scientific Expedition to Antarctica continues to provide unique insights into geomagnetic field behaviour at high latitudes. Continuous monitoring at Maitri and Bharati stations has revealed a decline in the Earth's main field strength, offering critical inputs for refining the International Geomagnetic Reference Field (IGRF) and advancing our understanding of the Earth's core dynamics.

The Institute also maintained leadership in magnetic instrumentation workshops, training a new generation of observers in precision techniques, calibration, and data processing. These initiatives not only sustain our observatory operations but also ensure the continuity of geomagnetic excellence for future decades.

The upper atmosphere and near-Earth space environment remain areas of prime national and international importance, given their profound implications for satellite communication, navigation, aviation safety, and space weather forecasting. IIG's contributions in this domain have been significant during the reporting year.

A landmark achievement was the progression of the PEERS mission, which, for the first time in India, will deploy a sounding rocket experiment designed to measure both electric and magnetic fields in the equatorial ionosphere. Through its double-probe electric field instrument and the Overhauser magnetometer, PEERS will address long-standing scientific gaps in our understanding of equatorial electrodynamics. Complementing this effort, laboratory spin-table tests have successfully validated payload deployment mechanisms, ensuring robust in-flight performance.

Our research on space weather has yielded novel insights into the extreme geomagnetic storm of May 2024, one of the most intense storms of the space era. Using coordinated observations from ground-based ionosondes, Swarm satellite data, and optical imagers, IIG scientists provided the first observational evidence of IMF By-driven electrodynamic processes in the equatorial ionosphere. The documentation of super-fountain effects and ionospheric uplift during this storm has advanced global understanding of solar wind-magnetosphere-ionosphere coupling.

The Institute also made notable contributions in capturing low-latitude auroral emissions over Ladakh during April 2023, a rare and scientifically valuable phenomenon. This observation highlighted India's growing capabilities in all-sky imaging and auroral science, while also providing critical inputs into the equatorward expansion of auroral ovals during solar storms.

Balloon-based investigations under the BEENS-2 experiment provided valuable datasets on stratospheric electric fields, while coordinated studies on volcanic forcing of ionospheric disturbances, particularly from the Tonga eruption, illustrated the Institute's ability to integrate atmospheric and ionospheric science. Complementing observational studies, our teams also developed advanced models, including the Iterative Gradient Correction (IGC) software for true height electron density retrieval and ARIMA-based forecasting for atmospheric electric fields that will serve as valuable tools for both research and applications.

Another important milestone was the indigenous development of a table-top Fabry-Perot Interferometer under the "Atmanirbhar Bharat" initiative, enabling high-quality measurements of thermospheric winds. This achievement adds to India's capability in space-weather-ready instrumentation.

Collectively, these efforts underline IIG's critical role in advancing India's preparedness for space weather challenges, while simultaneously enhancing global scientific knowledge of upper atmospheric processes.

Significant strides were made under the Solid Earth Research Programme. Using Ambient Noise Tomography and travel-time tomography, IIG researchers have constructed detailed 3D seismic velocity models of the North-East, a region characterised by complex tectonics and high seismicity. These models have revealed distinct crustal anomalies beneath the Shillong Plateau, Indo-Burma ranges, and Kopili Fault Zone, improving seismic hazard assessment in one of the most vulnerable parts of the country.

Sub-basalt imaging studies along the western coast and adjoining shelf have demonstrated the potential of synthetic modelling in improving the interpretation of buried basement structures under thick volcanic sequences, a long-standing challenge in Indian geoscience.

Investigations in Prayagraj demonstrated how magnetic susceptibility and scanning electron microscopy can effectively trace ultrafine pollutants and heavy metals in urban dust, offering an economical and rapid tool for environmental health assessments. Similarly, geophysical surveys in Joshimath provided crucial insights into land subsidence hazards, highlighting the importance of integrating resistivity imaging, magnetic measurements, and susceptibility analyses for risk mitigation in fragile Himalayan terrains.

Paleomagnetic studies have continued to shed light on long-term geomagnetic variations, with the construction of India's first archaeomagnetic secular variation curve spanning more than four millennia. Such reconstructions provide invaluable constraints for global geomagnetic field models and offer novel windows into the geodynamo processes operating in the Earth's core. Anisotropy of Magnetic Susceptibility (AMS) studies on dyke swarms, lake sediments, and seismites have furthered our understanding of magmatic flow, Holocene climate-tectonic interactions, and earthquake-induced deformation, thereby underscoring the versatility of magnetic techniques across solid Earth science.

Under the Geoscience and Applications Programme (GAP), 15 GNSS stations operated across the Eastern Himalaya provided crucial data on crustal deformation and seismic strain accumulation, strengthening India's earthquake risk monitoring network.

To deepen our knowledge of atmosphere-ionosphere interactions, IIG hosted AIDON 2025, a major workshop exploring tides, waves, and coupling processes in the upper atmosphere. Research in this area has led to better models for predicting ionospheric behaviour during extreme space weather events, with important implications for GNSS reliability and space-based communications. On the weather science front, IIG organised the 7th Indian Radar Meteorology Conference (iRAD 2025), providing a platform for experts to exchange advances in radar meteorology, severe weather monitoring, and climate dynamics. The Institute's Plasma Simulation Research Programme convened leading scientists at CPS-2024, highlighting state-of-the-art simulation methods for laboratory and space plasmas. Such activities strengthen India's capabilities in modelling complex plasma processes that underlie magnetospheric and ionospheric dynamics.

Keeping pace with digital transformation and cyber resilience, IIG has invested in upgrading its ERP modules, enhancing firewalls, and strengthening cyber security frameworks to ensure that its research data, computing infrastructure, and operational workflows remain secure and robust. The Institute's Library and Documentation Division continued to expand its scientific collections, streamline knowledge management, and complete rigorous stock verification exercises to support its researchers with seamless access to critical information.

The Institute has not confined itself to laboratory and field research alone. Our scientists have actively participated in international conferences, delivered invited talks, and contributed to high-impact publications. Several members received honours and awards, reflecting national recognition of IIG's excellence. True to its mission of knowledge dissemination, IIG has maintained a vibrant science outreach programme. Through school visits, National Science Day celebrations, exhibitions at the India International Science Festival (IISF) 2024, and various public lectures, the Institute has engaged thousands of students and teachers across the country, igniting curiosity about Earth and Space Science.

IIG has also promoted the use of Hindi through official language implementation, hosting Hindi workshops, competitions, and Hindi Day observances, strengthening its commitment to inclusive and effective communication in administrative and scientific domains.

Across these diverse programmes, a unifying theme stands out, IIG's commitment to integrating fundamental science with practical applications. Whether it is pioneering indigenous instrumentation, refining hazard assessment, mapping pollution, modelling space weather, or training the next generation of geoscientists, the Institute remains at the forefront of research that directly serves society.

This rich output would not be possible without the dedication and perseverance of IIG's faculty, research scholars, technical staff, project fellows, and administrative teams. Their collective efforts, whether in laboratories, field camps, remote observatories, or international collaborations, form the foundation upon which the Institute's reputation stands.

Equally vital is the unwavering support of the Department of Science and Technology, Government of India, which continues to empower the Institute with the resources and policy direction needed to pursue bold and impactful research goals. The guidance of the Governing Council, Research Advisory Committee, and Finance Committee has ensured that IIG's strategic priorities remain aligned with national objectives while maintaining the highest standards of administrative and financial discipline.

Looking forward, the Institute is poised to expand its contributions in new directions. Future plans include advanced modelling of lithospheric processes, integration of AI and machine learning in geophysical data interpretation, development of next-generation sensors for space weather monitoring, and strengthened partnerships with leading global research institutions.

On behalf of the Indian Institute of Geomagnetism, I express my deepest gratitude to all our stakeholders, collaborating institutions, funding agencies, and well-wishers. I thank the entire IIG family for their untiring commitment, scientific curiosity, and dedication, which have made the accomplishments documented in this report possible.

As we embark on another year of scientific exploration, I am confident that IIG will continue to illuminate new frontiers in geomagnetism and allied geosciences, building on its proud legacy of knowledge generation and nation building. I invite continued engagement and support from all quarters to advance our collective mission of understanding and safeguarding the dynamic Earth and its geospace environment.

A.P. Dimri
Director
August 26, 2025

GEOMAGNETIC OBSERVATORIES AND INSTRUMENTATION

MAGNETIC OBSERVATORIES AND INSTRUMENTATION (MOI)

Chief Coordinator : Geeta Vichare

Coordinator(s) : Gopi K. Seemala

Members : Prashant Tiwari, Technical staff of Instrumentation division at HQ, ODA and Magnetic Observatories

OBSERVATORY MAINTENANCE

Institute's magnetic observatories house various instruments such as Digital Fluxgate Magnetometer (DFM), Declination Inclination Magnetometer (DIM), Proton Precession Magnetometer (PPM) and Overhauser magnetometer for magnetic field measurements. Indigenously developed PPMs for absolute magnetic field observations are used in all the IIG observatories. Instrumentation division resolves various maintenance problems at the observatories and ensures the continuous, uninterrupted functioning of all the magnetic observarories (MOs) of IIG.

New DFM data logger is installed at MO Prayagraj, KSKGRL. ADAM 4017 of DFM at MO Rajkot is replaced and system is now operational. DFM electronic console for MO Nagpur, DFM GPS, Overhauser PPM at MO Silchar and MO Jaipur were repaired. PPM units at MO Nagpur and Praygraj were repaired and calibrated. Lightning activity hit MO Vishkahpattanam and damaged many instruments, which were repaired and replaced promptly.

A new advanced smart PC has been procured for the DFM data logger. The data logger software has been successfully installed on a Windows 11 operating system. The system is functioning efficiently with both DFM and PPM configurations. It is being deployed at magnetic observatories as a replacement for the older data logger systems.

The damaged Absolute Tower at MO Alibag is getting repaired and soon will be functional.

Hanle observatory was successfully revived at a new location inside the campus of Indian Astronomical Observatory at Hanle, Leh with a DFM and an Overhauser Magnetometer during October 2024. After the magnetic survey conducted in October 2022, a strategic and isolated location on a nearby hill was chosen for the construction of the non-magnetic chamber to house the observatory instruments. After the construction, cables for power transmission and optical data were laid between the chamber and the data logger room.

Figure 1 Revival of Hanle Magnetic Observatory, Ladakh

A wooden shelf was built to house the data logger setup. The entire system is powered by a 12-volt, 150 Ah tubular battery connected to an inverter. Among the instruments installed were the DFM and the Overhauser Magnetometer, which were tested at MO Alibag before installation at Hanle, Ladakh observatory. These instruments are now actively recording data, marking the revival of magnetic field measurements in the region after a brief hiatus Figure 1.

OBSERVATORY WORKSHOP

The Magnetic observations and Instrumentation (MOI) workshop was held at MO Alibag during 10 to 13 March 2025. A total of 25 IIG staff from each of the observatory along with newly joined Technical staff participated in this workshop. The participants were given training and lectures on data processing and precise observations, latest knowledge on magnetometers and PPM. They also received training in handling administrative matters in their role as AIC. The participants were given hands-on exercises, knowledge of the calibration process, troubleshooting techniques, and best practices to ensure reliable measurements.The PPM

Figure-2 MOI workshop group photo.

magnetometers of each observatory were calibrated during the workshop, and a detailed Calibration Report has been prepared.

INTERMAGNET

INTERMAGNET is a global network of observatories, monitoring the Earth's magnetic field, adopting modern standards for measuring and recording equipment in order to facilitate high resolution data exchange in near real time. IIG is a participating Institute in this programme. Earth's magnetic field data received from ALIBAG and JAIPUR are processed and emailed to Kyoto GIN in near real time. These data can be viewed as Quick-Look plots at the Kyoto website (http://wdc.kugi.kyoto-u.ac.jp/plot_realtime/intermagnet/index.html).

INSTRUMENTATION

Overhauser Magnetometer

IIG has achieved a major scientific and technological breakthrough in 2023 with the in-house development of India's first Overhauser magnetometer. Designed for high-precision measurement of Earth's magnetic field, this achievement positions IIG at the forefront of scalar magnetometry research in the country. The Overhauser magnetometer, based on the principle of dynamic nuclear polarization-enhanced nuclear magnetic resonance, is capable of delivering nanotesla-level resolution with low power consumption and high signal stability, making it an ideal candidate for future space missions.

In recognition of the novel techniques employed in the development of this instrument, IIG has submitted two patent applications to the Indian Patent Office. These applications are currently under review:

Patent 1 (Application No. 202421084053): ***- An Overhauser Magnetometer Probe and a Method for Preparation Thereof***

Patent 2 (Application No. 202521009504): - ***Method to Operate Overhauser Magnetometer in Different Solvents at the Same Resonance Frequency***

These patents are expected to provide a strong intellectual property foundation for future research, commercialization, and international collaboration in precision magnetometry.

Development of Overhauser Magnetometer for Space borne experiments

To adapt the Overhauser sensor for space applications, several critical upgrades are currently underway. These include miniaturization of the RF and pickup coil assemblies, ruggedization of the sensor cavity using vibration-damping materials such as Sorbothane and silicone, electromagnetic compatibility enhancements, and transition from laboratory to flight-grade electronics. Modifications also include thermal insulation and radiation-tolerant enclosures to protect the delicate electronic components in the harsh space environment. The sensor mount has been redesigned using non-magnetic materials and optimized to mitigate interference from ferrous payload elements.

As a key step towards the flight qualification, the Overhauser magnetometer is being integrated into the PEERS (Probing the Equatorial Electrojet using Rocket Sounding) mission, which will be flown aboard the RH300 sounding rocket in late 2025. This mission will serve as the first in-flight validation of the Overhauser magnetometer in a near-space environment. The payload design largely isolates the sensor from rocket-induced magnetic noise. The flight will provide valuable insight into the sensor's performance under dynamic flight conditions, including mechanical vibration, thermal stress, and electromagnetic interference. This milestone will mark the transition of the Overhauser magnetometer from laboratory prototype to a flight-qualified instrument suitable for space science missions and future satellite platforms.

PEERS – Probing the Equatorial Electrojet using Rocket Sounding

The PEERS (Probing the Equatorial Electrojet using Rocket Sounding) project is a landmark effort undertaken by IIG to investigate the electrodynamics of the equatorial ionosphere, particularly the equatorial electrojet (EEJ), using a dedicated sounding rocket experiment. In 2024–25, the project achieved several significant milestones.

Figure 3 Payload Assembly-nose enclosed position

The payload design was finalized to include a Vector Electric Field (VEF) instrument for double-probe electric field measurements and an Overhauser Magnetometer (OVM) to measure the ambient geomagnetic field with high precision. The detailed preliminary design review document is submitted to TERLS-VSSC team for their approval of the payload design. This experiment is the first of its kind in India to conduct simultaneous electric and magnetic field measurements onboard a sounding rocket platform (Figure 3), addressing a scientific gap of more than two decades.

One of the critical advancements was the successful development of a passive boom deployment mechanism. Each electric field boom consists of four nested coaxial fiber-reinforced plastic sections, which extend horizontally through centrifugal action (Figure 4) after the rocket reaches the deployment altitude of approximately 60 km. This extension is initiated by the cutting of a nichrome wire using a digitally triggered wire cutting mechanism. A custom boom locking system ensures secure locking of the booms in their fully deployed state. Extensive mechanical analysis and deployment torque calculations confirmed that the centrifugal force generated at spin rates around

Figure 4 Payload Assembly-Expanded position

Figure 5 Spinning stability test on Rotating platform

6 rps (minimum 2.2 rps) is sufficient to overcome opposing forces such as gravity and friction. The rocket's spin rate is expected to reduce to about 4.8 rps post-deployment due to conservation of angular momentum.

In parallel, a full-scale rotating platform was fabricated and commissioned at IIG to validate payload dynamics and deployment behaviour under spin conditions mimicking actual flight. Using this rotating test table, mechanical stability tests were successfully performed on the integrated payload (Figures 5 and 6). These spin tests confirmed the robustness of the boom deployment mechanism and verified the balance and dynamic stability of the entire system during rotation.

Figure 6 Spin test on rotating Platform

UPPER ATMOSPHERIC RESEARCH

POLAR AND SPACE WEATHER RESEARCH (POWER)

Chief Coordinator : B. Veenadhari

Coordinator(s) : Gopi K. Seemala

Members : Satyavir Singh, Geeta Vichare, Navin Parihar, Mala Bagiya, Remya Bhanu, B. Jayashree, C. P. Anil Kumar, Prasant Tiwari, C. Selvaraj, C. Panneerselvam, Rahul Rawat, Sarvesh Chandra, Research Students and Research Associates

Manifestations of Strong IMF-By on the Equatorial Ionospheric Electrodynamics during 10 May 2024 Geomagnetic Storm

Understanding the effects of east-west component of interplanetary magnetic field (IMF-By) on the equatorial ionospheric electrodynamics is challenging due to the complex response caused by the simultaneous occurrence of multiple mechanisms during disturbed times. The extreme geomagnetic storm on 10 May 2024 caused by multiple-ICME interactions accompanied with unprecedented IMF-By magnitudes and its polarity, changed from west to east by 130 nT during northward IMF-Bz turning. The ground ionosonde observations of h'F from near-equatorial locations (Figure 7), along with the latitudinal profiles of plasma densities from Swarm satellites reveal the first observational evidence of the impact of strong IMF-By near the dusk-terminator (17–19.5 LT), causing strong dawn-to-dusk ionospheric electric fields during northward IMF-Bz. This electric field produces large uplift of the ionospheric plasma near equator and subsequent super-fountain effect near the dusk. The combined effect of increased IMF-By amplitudes and viscous terms might have resulted into the enhanced coupling of solar wind with the magnetosphere.

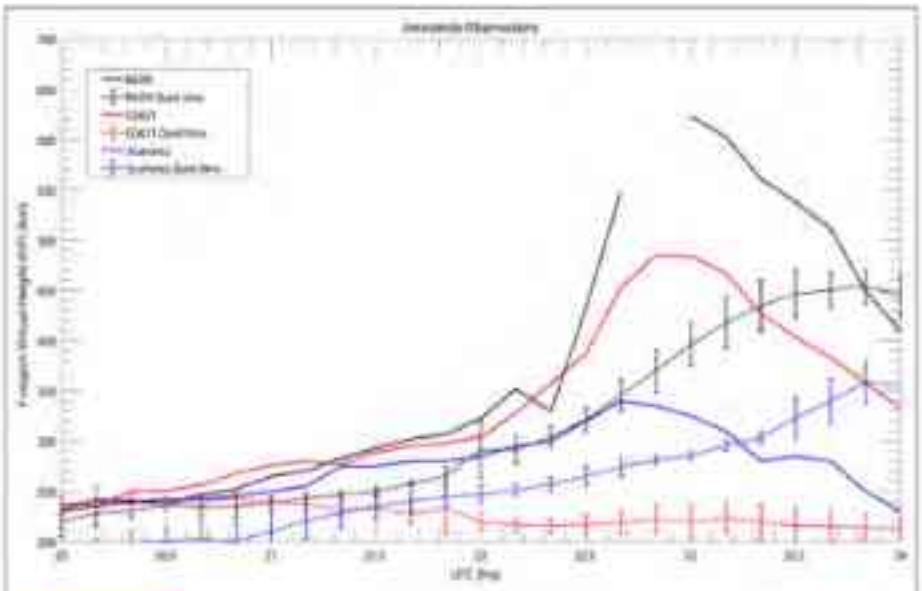

Figure 7 Variations of the F-region base height (h'F) during 20–24 UT on 10 May 2024 for three ionosonde stations: BVJ04 (Black curve) (Geographic: 2.8°S, 60.6°W; Geomagnetic:11.98°N); CGK21 (Red curve) (Geographic: 20.4°S, 54.6°W; Geomagnetic:11.31°S) and Jicamarca (Blue curve) (Geographic:12°S, 76.8°W; Geomagnetic:0.7°N). Dashed curves indicate quiet time variations along with error bars. Different vertical colour bars indicate different IMF conditions.

Low-latitude Auroras: Insights from 2023 April 23 Solar Storm

In 2023 April, a low-latitude aurora observed by the all-sky camera at Hanle, Ladakh, India (33°14'N geographic latitude), generated significant interest. This was the first such aurora recorded from the Indian region in the space era and occurred during a moderate solar storm. This low-latitude auroral sighting happened during the sheath-region passage of an interplanetary coronal mass ejection. The auroral observations at Hanle coincided with intense substorm activity. Using in situ multispacecraft particle measurements and geomagnetic field observations from both ground-based and satellite-based magnetometers, it is found that the aurora did not actually reach India, rather the equatorward boundary was beyond 50°N geographic latitude. Enhanced electron fluxes with energies below 100 eV were detected at 54°N geographic latitude at about 830 km altitude in the predawn sector (4–5 hr local time) (Figure 8). Based on Hanle observations and emission altitudes of 600–650 km due to low-energy electrons, the equatorward boundary is estimated to be around 52°N geographic latitude in the midnight sector (Figure 9). Thus, the low-latitude red aurora observed from India resulted from the emissions at higher altitudes due to low-energy electron precipitation in the auroral oval and a slight equatorward expansion of the auroral oval. The low-energy electrons likely originated from the plasma sheet and were precipitated due to enhanced wave–particle interactions from strong magnetosphere compression during high solar wind pressure.

Geomagnetic storms associated changes in the thermal structure of the Mesosphere-Lower Thermosphere region

Global response of the thermal field of the Mesosphere-Lower Thermosphere region to the "Extreme" geomagnetic storm of 10-13 May 2024: Geomagnetic storms can directly

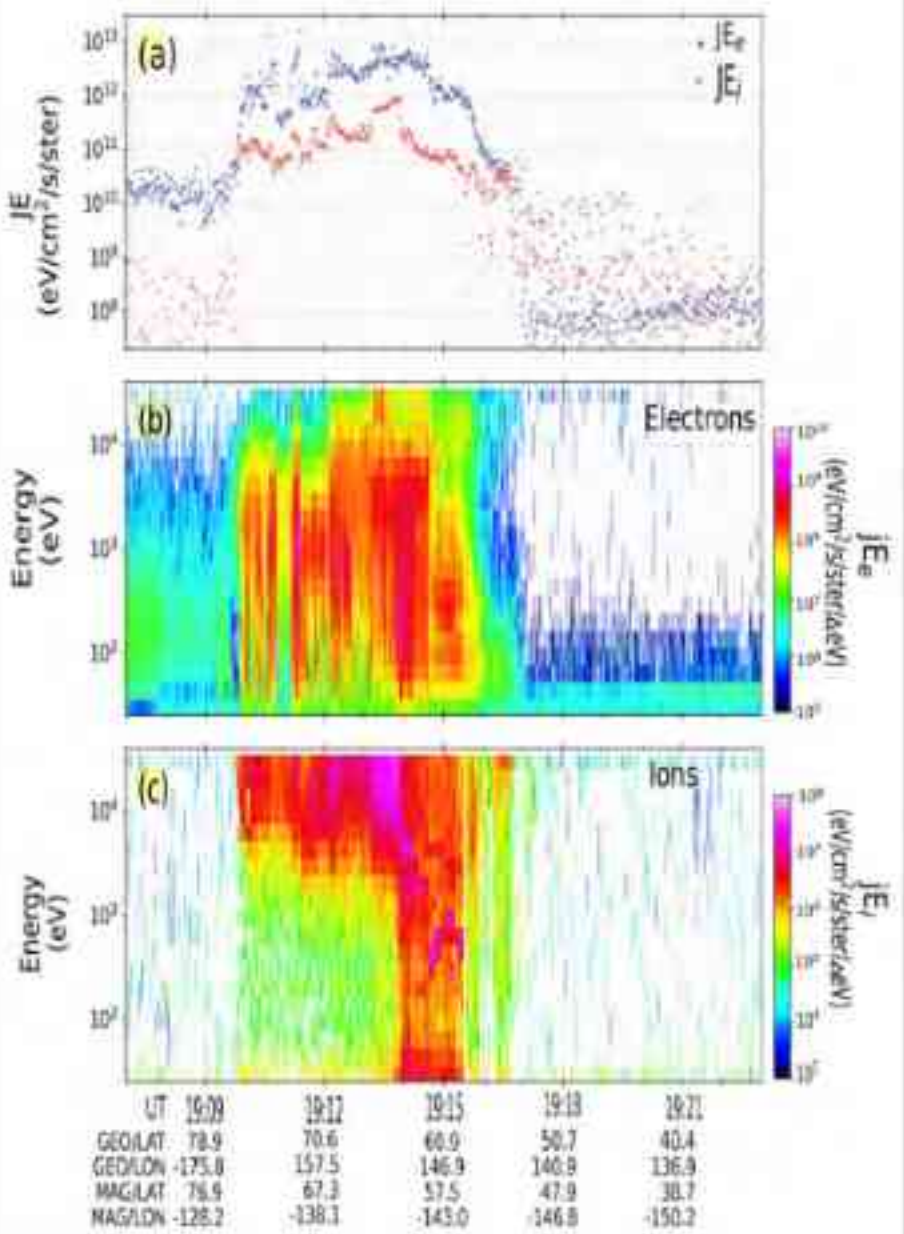

Figure 8 Total particle flux over the Northern Hemisphere in the entire low-energy band for electrons and ions. (b) Energy–time spectra for electrons. (c) Energy–time spectra for ions during 19:07–19:23 UT on 2023 April 23.

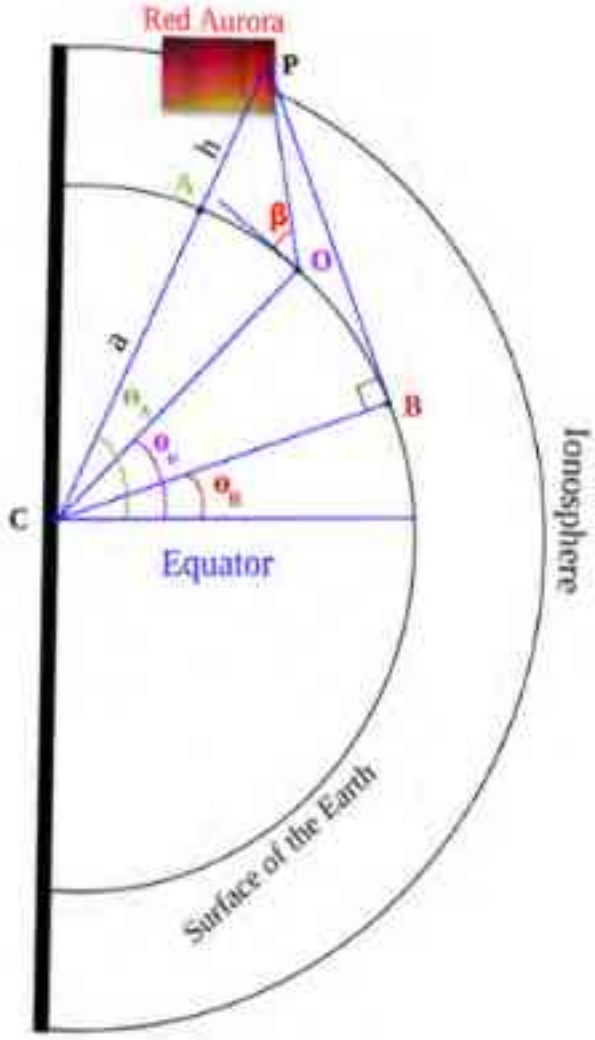

Figure 9 Sketch showing the geometry of auroral visibility at observer latitude (θo). C is the center of the Earth; a is the radius of the Earth; P is the point of auroral precipitation at height "h" km at GGLat θA , and A is the point on the surface of the Earth. B is the tangent point at the surface of the Earth line originating from point P, and θA is the latitude of that point. β is the maximum elevation angle of the aurora seen by the observer. The sketch is not to scale.

affect the thermal structure of the MLT region over the Polar Region-Auroral Oval and high-latitudes via Joule and auroral heating. Auroral Oval's boundary can expand towards the equator as the level of geomagnetic storm increases. Consequently, geomagnetic storm-induced changes in the MLT region are expected in lower latitudes as well. Storm-induced changes in global wind circulation can further influence the MLT region at mid- and low-latitudes. Study presents the global response of the thermal structure of the MLT region to the "Extreme" geomagnetic storm of 10-13 May 2024 (Dst ~ -412 nT, SYM-H ~ -518 nT and Kp = 9) using Sounding of the Atmosphere using Broadband Emission Radiometry (SABER) instrument observations. Globally, during storm time, the MLT region was warmer above ~98 ± 4 km and warming even penetrated down to ~86 ± 3 km and below over some latitudes. Warming appeared to be more pronounced over the Polar Region and auroral oval (PRAO) on 11 May. A warmer MLT region in 45-83° latitude band can be directly linked with the superstorm associated Joule-cum-particle heating, and the expansion of auroral oval to the lower latitudes. Below 45° latitudes, the observed warming can be attributed to the changes in global circulation pattern brought about by this extreme storm.

Cosmic Ray Variations during Extreme geomagnetic Storm on May 10-11, 2024

Multiple interplanetary coronal mass ejections (ICMEs) erupted from active region AR 13664 during 8-13 May 2024. On May 10, 2024, after the arrival of the ICME shock at 17:04 UT, Forbush Decrease (FD) is seen in various Neutron Monitor (NM) stations located worldwide (Figure 10). A comprehensive analysis of neutron data from 28 NM stations and gamma-ray data obtained from NaI(Tl) detector at Maitri, Antarctica is performed. It is reported for the first time about the ICME shock-sheath related enhancement of ~3-5% magnitude in the neutron flux at stations located at higher altitudes (≥ 1000 m) with geomagnetic rigidity

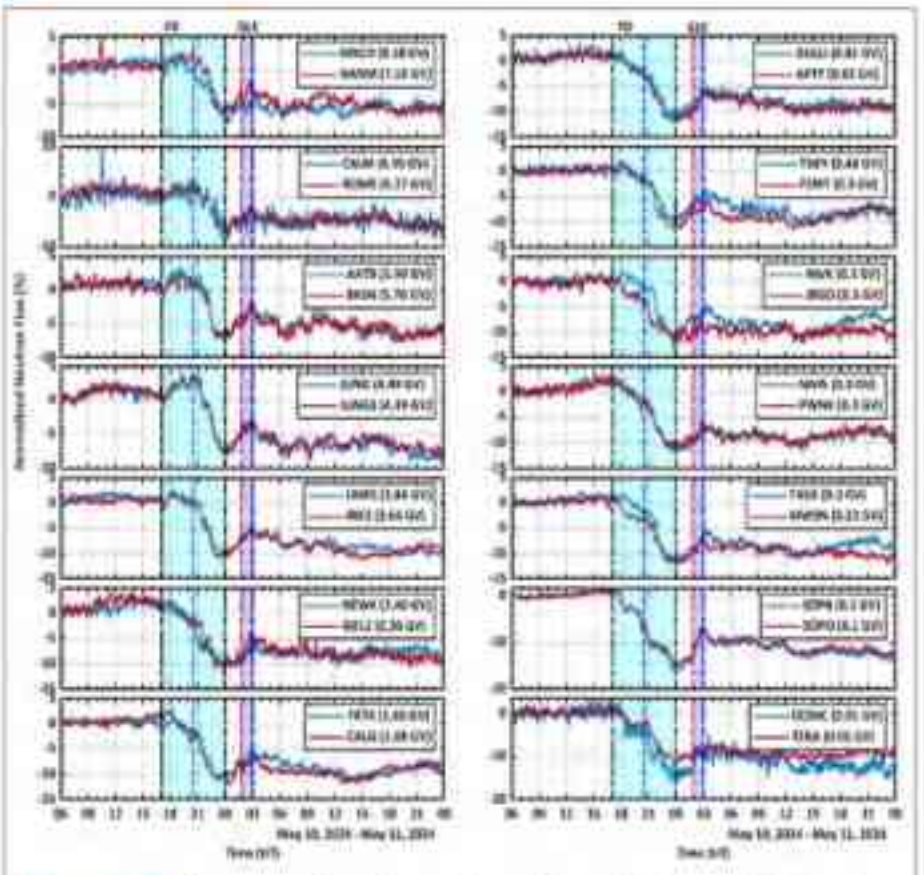

Figure 10 Normalized neutron flux (%) variation at 28 Neutron Monitor stations during 10-11 May 2024 exhibiting Forbush Decrease (FD)

between 4 and 7 GV. It appears that the asymptotic directions do not have much role in this increase, and is found to be associated with the passage of ICME shock-sheath, triggering the precipitation of magnetospheric particles. The variation of FD amplitude with rigidity shows a decreasing trend in general, with a minimum amplitude at 5-7 GV, which is attributed to the location of field-aligned currents (FACs). The FD amplitude is found to have the effects of storm-time westward ring current, FACs and magnetospheric dynamics, in addition to the ICME parameters. During the recovery phase of FD, enhancement is observed between 01:50-03:00 UT on 11 May 2024, which coincided with Ground Level Enhancement (GLE#74). The GLE#74 was coeval with the strong SYM-H index and the sudden recovery of the FD due to reduced interplanetary magnetic field, which might be responsible for the observed enhancement at high rigidity stations.

Modelling the Atmospheric Electric Field

Efforts are taken to model Atmospheric electric field (AEF) during fair-weather conditions by utilizing data collected from an Electric Field Mill (EFM) spanning from 2020 to 2024 and applied the ARIMA model. This parametric modelling method provides a good forecast to enhance the prediction. This is achieved through the auto-regressive integrated moving average and the model parameter is determined by the minimum value of Akaike Information Criterion (AIC). The observations from 2020 to 2022 mainly used for in-sample predictions. The model was trained on the 2023 dataset and validated against 2024 data to assess its generalization capability. The ARIMA framework enables both short-term forecasting and analysis of long-term temporal patterns in AEF dynamics. With the application of ARIMA modelling more nuanced understanding of the spatio-temporal dynamics of AEF processes can be studied. These achievements pave the way for more accurate forecasting of AEF impacts on critical aviation technological infrastructure.

Identifying the Relationship between Joule Heating and the Auroral Electrojet (AE) Index

A linear regression analysis is performed between Joule Heating (JH) and the Auroral Electrojet (AE) index during solar cycle 23, revealing a strong linear correlation. Demonstrated that as the AE index increases, the JH rate similarly increases, validating the expected dynamics of geomagnetic storms and auroral processes. Applied spectral coherence analysis to quantify the relationship between the two signals, identifying both temporal and spectral links and highlighted that variations in JH are coupled with changes in the AE index, showcasing the inter-dependence of auroral currents and electric field dynamics. Proposed a comparative relational algorithm to better analyze the relationship between JH rates and AE index, providing valuable insights for space weather prediction. Discovered that increased Joule Heating (JH) during the solar maximum of solar cycle 23 had significant effects on auroral and subauroral regions, influencing ionospheric ionized particle density conditions. Successfully linked JH variations with enhanced TEC variation contributing to improved prediction of ionospheric condition, which is crucial for the reliable operation of modern technology systems and low orbital drag of satellites.

Effects of background wind and dissipation processes on the atmospheric solar tides

The radiation coming from the Sun heats the Earth's atmosphere and generates atmospheric tides. Recently developed model for the atmospheric tides is used to investigate the effects of background wind and various dissipation processes. The equations for tidal oscillations of wind and temperature in the atmosphere encompass factors such as background wind, temperature profile, and background composition including ozone, carbon dioxide, hydro-magnetic interactions, Newtonian cooling, eddy, and molecular diffusion. These components interact to define the behavior of tidal phenomena comprehensively. Thermal forcing processes include the insolation absorption of H_2O in the troposphere, O_3 in the stratosphere, and a contribution

from O_2 absorption in the thermosphere. The obtained results for diurnal and semi-diurnal components are in good agreement with the Global Scale Wave Model (GSWM-00). It is found that the background wind plays significant role in affecting the horizontal wind oscillations below 100 km. At higher altitudes (100–200 km), the background wind, ion drag force, divergence of momentum, and heat fluxes due to molecular and eddy diffusion have a considerable role in affecting the zonal and meridional winds (Figure 11).

Effect of vertical shear in the zonal wind on equatorial electrojet sidebands: An observational perspective using Swarm and ICON data

The wind dynamo in the ionosphere leads to differential motion of ions and electrons, which in turn sets up electric fields and currents. Observations show that daytime lower thermospheric horizontal winds have large vertical gradients. Numerical modeling conducted approximately 50 years ago demonstrated that the zonal wind shears in the ~130–180 km altitude range can generate off-equatorial dips in the daytime height-integrated eastward current density, appearing as westward sidebands north and south of the equatorial electrojet (EEJ). This connection was observationally confirmed for the first time by combining zonal wind profiles from the Ionospheric CONnection (ICON) Explorer with latitudinal zonal currents from the Swarm mission. The observations demonstrated that the magnitude of the EEJ sideband current is proportional to the strength of westward-turning winds with altitude in the Pedersen conductivity-dominated region (Figure 12). Additional numerical experiments explain the importance of wind shear in different altitude regions in generating the sideband current. This study contributes to the better understanding of the neutral wind effect on the local current generation.

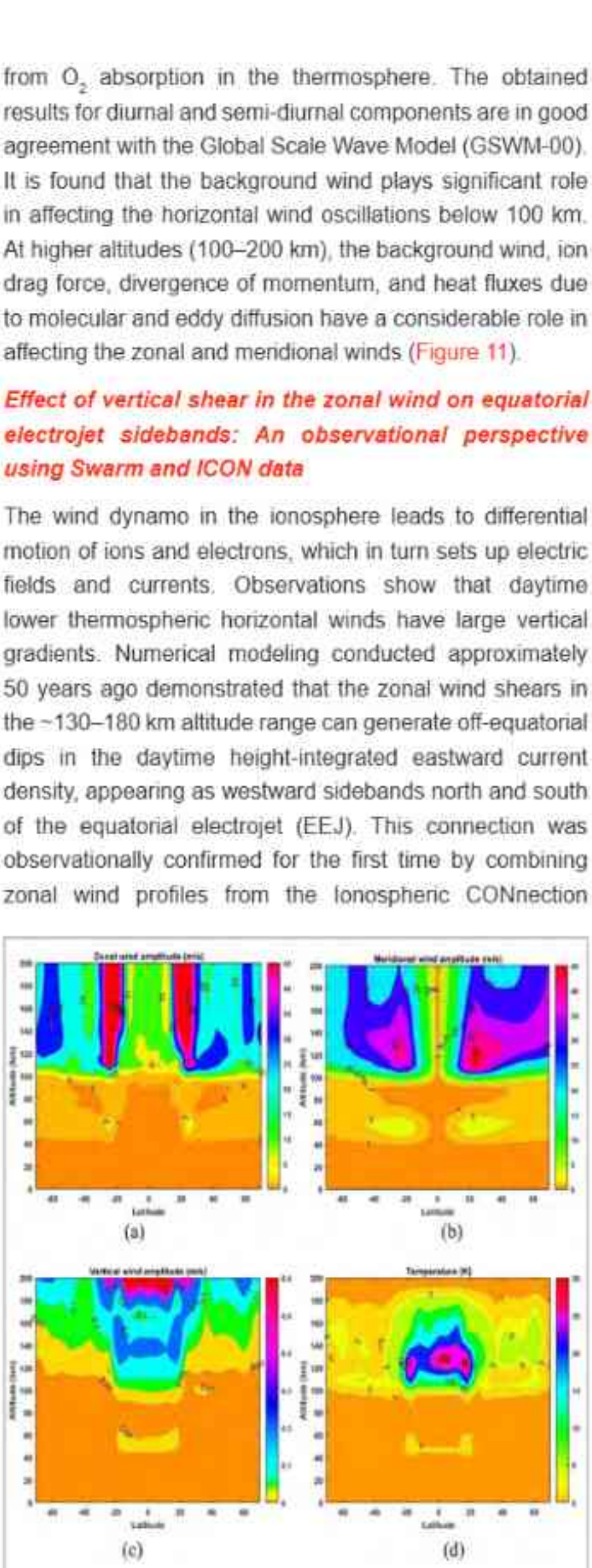

Figure 11 Diurnal tidal perturbations in (a) zonal, (b) meridional, (c) vertical winds, and (d) temperature, during March equinox as a function of latitude and altitude.

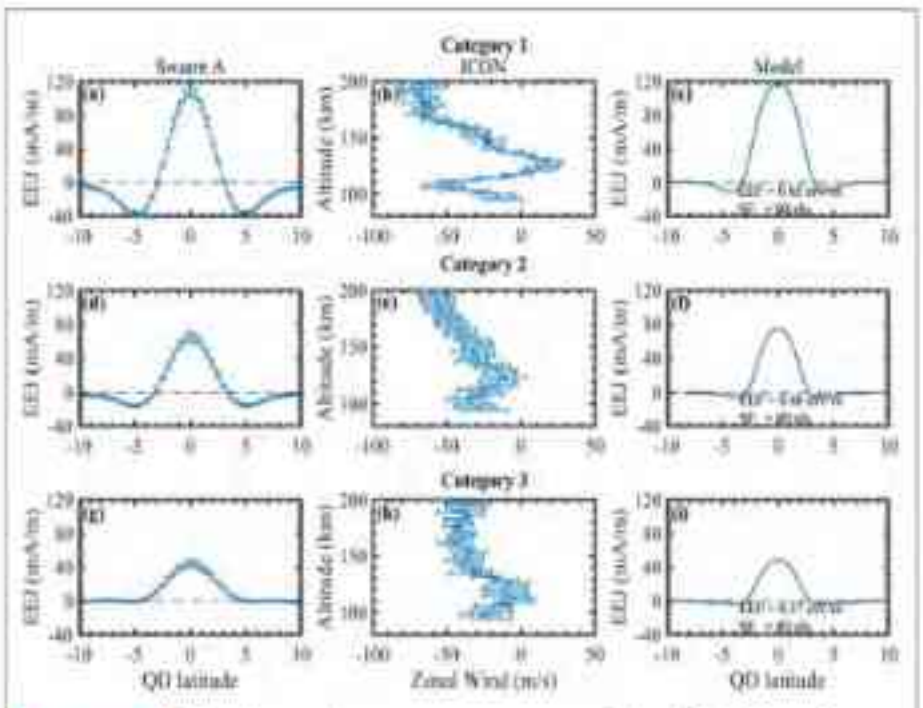

Figure 12 The three columns are average profiles of EEJ from Swarm A, zonal wind from ICON/MIGHTI, and the corresponding EEJ from the model, respectively. This analysis is for grouping of data according to sideband current strength. Swarm EEJ and ICON zonal winds are plotted with standard errors.

INDIAN SCIENTIFIC EXPEDITION TO ANTARCTICA

Two members (one each for Maitri and Bharati stations) for winter were deputed for the 44th Indian Scientific Expedition to Antarctica (ISEA). All the experiments at both stations are running uninterrupted. Measurements of total magnetic field at Maitri in campaigns and by IGRF model had indicated large decline in magnetic field (~ 110 nT/year) during the last few decades. However, the continuous monitoring of geomagnetic field at Maitri indicates that recently it is reducing at a rate of approximately 65 nT/year. A systematic rapid decline in the Earth's complex main magnetic field is important for monitoring the evolution of the physical processes occurring in the outer core of the Earth.

Continuing a proud legacy at the IIG, Mr. Subrata Moulik, Technical Officer III from IIG, led the 43rd ISEA at Maitri Station, and Mr. Ramana Murthy is a leader of 44th ISEA

at Bharati station.IIG's leadership role in ISEA strengthens IIG's longstanding contribution and commitment to India's polar research and scientific excellence.

DYNAMICAL AND ELECTRODYNAMICAL COUPLING OF THE ATMOSPHERE-IONOSPHERE SYSTEM USING RADIO AND OPTICAL TECHNIQUES (DECA)

Chief Coordinator : S. Sripathi

Coordinator(s) : S. Tulasiram

Members : S. Gurubaran, Rajesh Singh, R. Ghodpage, Navin Parihar, S. Sathish Kumar, Jayashree B., Shantanu Pandey, Sukanta Sau, Ayushi Srivastava, Research Students and Research Associates

Balloon Experiment on the Electrodynamics of Near Space (BEENS-2)

The Balloon Experiment on the Electrodynamics of Near Space (BEENS) primarily aims to investigate and understand the mechanisms that drive various electric field sources at low latitudes, thereby creating a database of stratospheric electric fields from a low latitude continental site. The second iteration of the BEENS experiments with a modified payload design was carried out on the night of January 17-18, 2025, during the pre-midnight to early morning hours, utilizing a 65,000 cubic meter balloon that ascended to a float altitude of ~33 km (Figure 13). The instrumentation package included a double probe at TIFR Baloon Facility, Hyderabad configuration with eight

Figure 13 Photograph of BEENS payload depicting the spherical probe sensors attached to 2 m long booms.

Figure 14 BEENS payload ready for deployment.

probes, each probe pair on a baseline of ~5 m (Figure 14). This configuration enabled measurements of two independent sets of horizontal and vertical electric field components gathered from four different channels. This was a significant improvement over the probe configuration adopted during the last BEENS experiment that had a 5-probe configuration with noise emanating from one of the probes contaminating the vertical electric field and one of the horizontal electric field measurements. Additionally, on BEENS-2, a pair of 3-axis magnetometers (one being a fluxgate sensor and the other a commercially available low-cost magneto-resistive sensor) was employed to provide references for the electric field measurements. The central payload structure, known as the gondola, was rotated to facilitate the determination of the horizontal electric field component (Figure 15 & Figure 16). A float duration of ~6 hours at the ceiling altitude of ~33 km could be achieved during this experiment. Initial analysis of the

Figure 15 Picture showing the main balloon along with the two pilot balloons and the long loadline.

data indicates the presence of a much larger 20-30 mV/m horizontal electric field compared to that measured on BEENS-1 (Figure 17). The underlying processes for the presence of such a large electric field at stratospheric altitudes at low latitudes are being examined.

Figure 16 BEENS payload – after lift-off

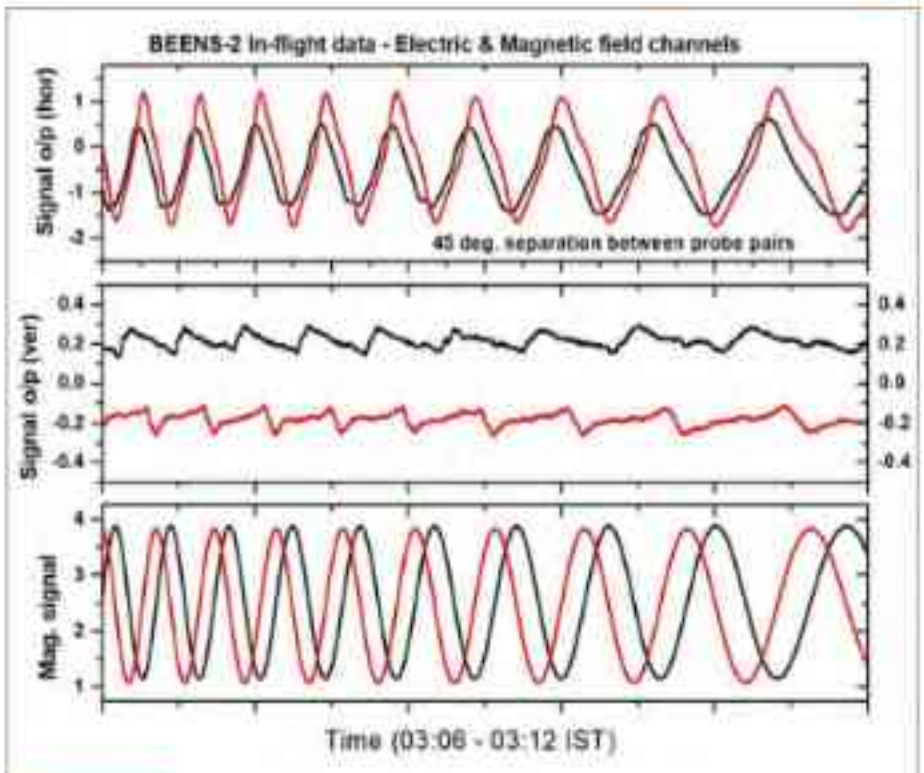

Figure 17 Raw signal output from BEENS-2 payload.

Atmosphere–Ionosphere Coupling over India Triggered by the Tonga Volcanic Eruption and its role in Equatorial Plasma Bubble Generation

Under this study, a significant advancement has been made in understanding the impact of the 15 January 2022 Tonga volcanic eruption on the atmosphere–ionosphere system over the Indian subcontinent by utilizing coordinated measurements from digital ionosondes at Tirunelveli and Prayagraj along with other ground and space-based observations. The volcano explosion trigged gravity waves in the troposphere which are propagated to the stratospheric altitudes as seen in the AIRS satellite (Figure 18). The present study reports the rare occurrence of equatorial plasma bubbles (EPBs) and plasma blobs (PBs), particularly during midnight hours trigged by Tonga Volcano generated atmospheric disturbances. In situ electron density data from Swarm B and C satellites confirm the presence of strong plasma depletions associated with EPBs. A key finding is the enhancement of the Pre-Reversal Enhancement (PRE) in eastward zonal winds prior to the onset of spread-F at Tirunelveli, likely driven by volcanic-induced atmospheric changes. Isofrequency analysis reveals gravity wave-like oscillations in the equatorial F-region, while TEC observations from multiple stations across India, including PRN-14 satellite data, identify two dominant Traveling Ionospheric Disturbances (TIDs) with speeds of approximately 452 m/s and 406 m/s and periods of 65–75 minutes (Figure 19). This investigation

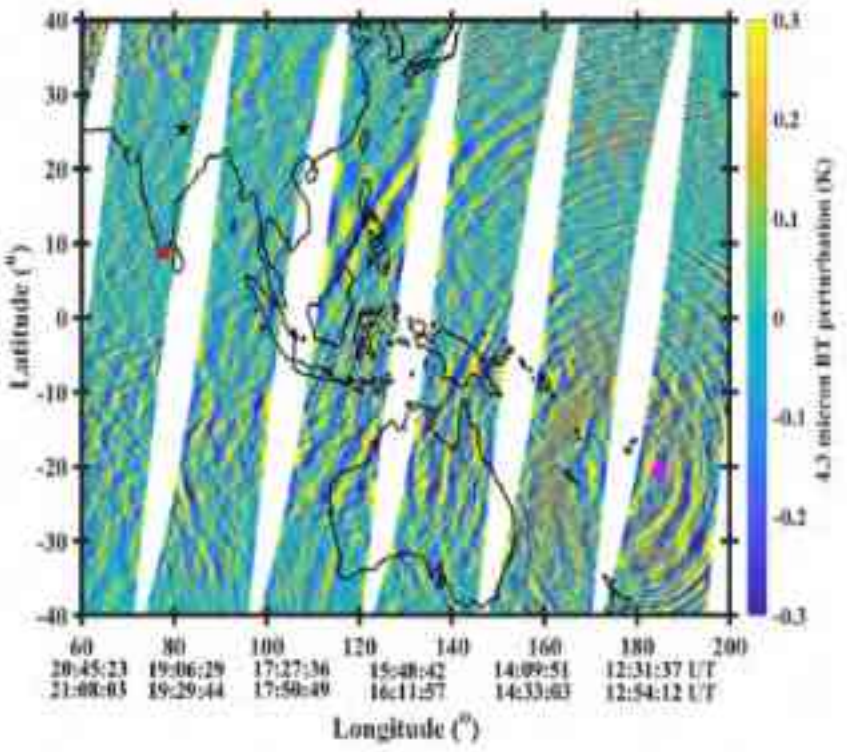

Figure 18 Propagation of gravity waves from the Tonga volcanic eruption observed by NASA's Aqua satellite at 4.3-micron Brightness Temperature (BT). The pink triangle marks the eruption location, while the red and black hexagrams indicate Tirunelveli and Prayagraj. Concentric gravity wavefronts propagate from the eruption site toward the Indian region between 12:31 UT and 21:08 UT, illustrating the atmospheric perturbations triggered by the explosion at 04:15 UT.

suggests that strong atmospheric disturbances generated by Tonga volcanic explosion could propagate into the ionosphere and trigger plasma instabilities via wave coupling mechanisms. Present findings strongly suggest that gravity waves triggered by the Tonga eruption played a pivotal role in seeding EPBs by modifying zonal winds, meridional dynamics, and ionospheric densities. The simultaneous observation of EPBs and PBs at both equatorial and low mid-latitude locations over India underscores the ability of volcanic eruptions to induce long-range ionospheric perturbations, making this event a unique case of atmosphere–ionosphere coupling over the Indian region.

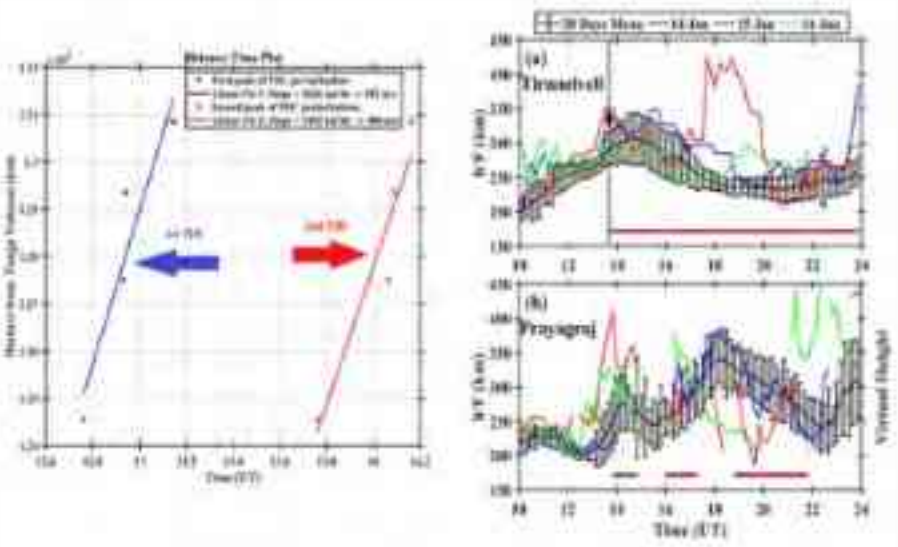

Figure 19 (a) Distance–time plot of TEC perturbations observed over Colombo, Tirunelveli, Bangalore, and Hyderabad on 15 January 2022 (Tonga eruption day). The blue and red dots represent the signatures of two Travelling Ionospheric Disturbances (TIDs) propagating with approximate velocities of ~452 m/s and ~406 m/s, respectively.

(b) Temporal variation of the F-layer base height (h'F) over Tirunelveli and Prayagraj during January 2022. The red lines indicate the variation on the eruption day, while red-shaded patches mark the occurrence of Equatorial Plasma Bubbles (EPBs) and Plasma Blobs (PBs), highlighting the ionospheric response to the volcanic eruption.

Development of True Height Profiling Software using Iterative Gradient Correction (IGC) Method

Deriving the precise true height electron density profile from the measured ionosonde virtual heights is quite a challenging problem. Recently, a new method, Iterative Gradient Correction (IGC) method is developed for true height analysis that uses HF radio wave propagation path computations to reconstruct the true height profile. Through iterative corrections on electron density gradients between successive points, the IGC method minimizes errors below a specified tolerance at each point and reconstructs a complete electron density profile. The derived profiles from the IGC method are found to be accurate when compared with Incoherent Scatter Radar (ISR) and Global Navigation Satellite System – Radio Occultation (GNSS-RO) observations (Figure 20). To facilitate true height analysis by IGC method for a wider user community, a MATLAB-based software has been developed and is outlined in this report. The software can be installed on any Windows

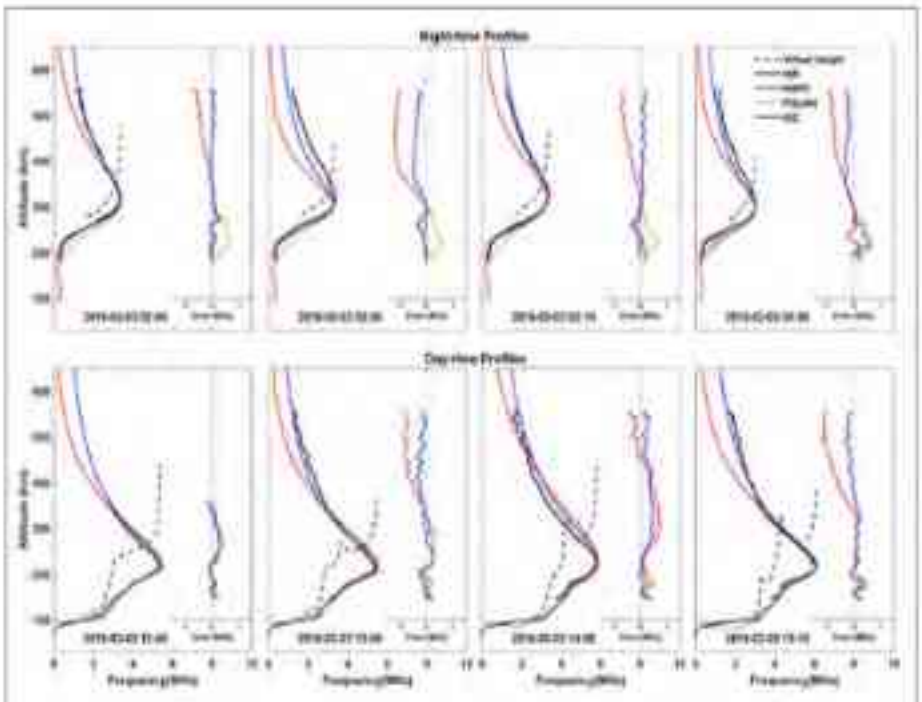

Figure 20 Comparison of true height electron density profiles derived from Iterative Gradient Correction, POLAN, and NHPC with the Incoherent Scatter Radar (ISR) measured profiles. Each panel show deviations of true height profiles by different methods with respect to ISR profiles.

platform and is designed with a user-friendly interface for easy and efficient application by the users. It can analyze multiple scaled ionograms in a single run and outputs the real height profiles in ASCII format. Further, the software also captures important ionospheric parameters such as the base altitudes and peak frequencies of E and F-layers (e.g., hE, hF, foE and foF2) etc., from the computed true height profiles and tabulates in a separate output file for the ready use. The software also provides the option for extrapolation of true height profile into top-side ionosphere up to a user-specified height and reconstructs the complete vertical electron density profile.

Validation of MLT Region Temperatures Using EGRL Photometer

Temperatures in the mesosphere lower thermosphere (MLT) region are estimated with the EGRL photometer during February–April 2015. A comparison between temperatures obtained concurrently with the EGRL photometer and the SABER instrument onboard the TIMED satellite showed an excellent correlation (Figure 21). Besides that, a considerable agreement was observed between the photometer and NRLMSISE-00 model temperatures.

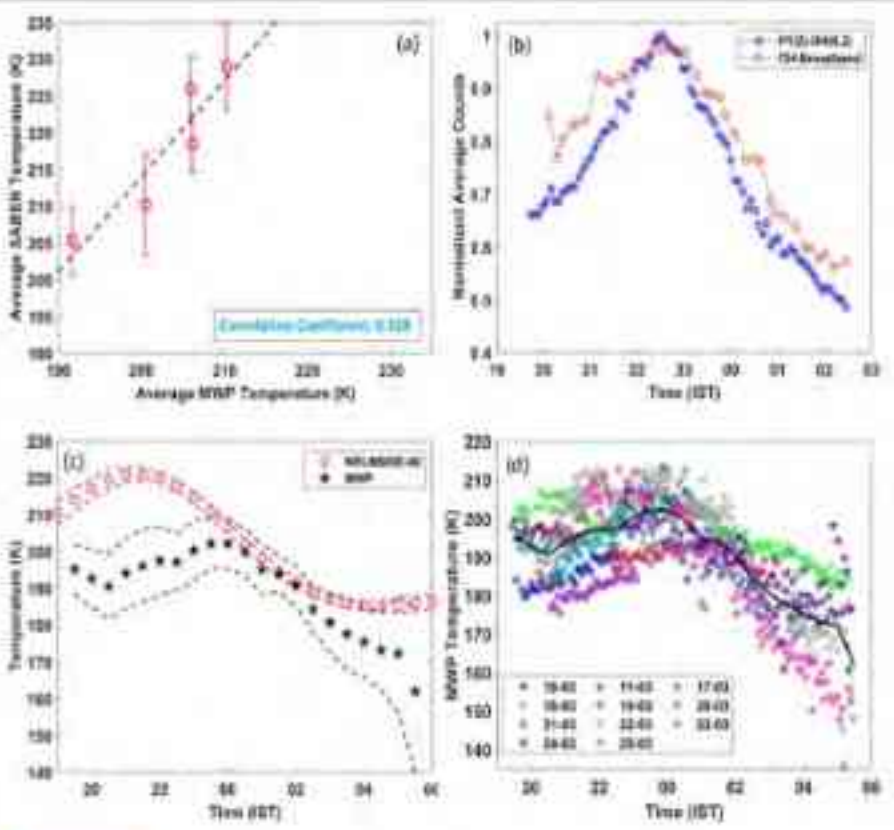

Figure 21 Shows (a) Weighted SABER temperatures as a function of the average MWP temperatures. (b) Temporal variations of normalized intensities of the P1(2) line of the OH(6,2) band and the mean OH broadband on 19 February 2015. (c) Temporal variations of half-hourly mean MWP and NRLMSISE-00 model temperatures in March 2015. (d) Temporal variation of MWP temperatures on different nights in March 2015 (Different colors represent different nights). The solid black line represents half-hourly mean MWP temperatures.

The airglow intensity measured by the EGRL photometer matched very well with the intensity recorded by a co-located all-sky airglow imager. In addition, spectral analysis of photometer temperatures and intensity recorded by the airglow imager revealed the same dominant periodicity. These results validate the airglow intensity and temperature obtained with the EGRL photometer.

Thermospheric Wind Studies using Table-Top Fabry–Perot Interferometer

Measuring thermospheric winds in the ionosphere low latitude are extremely important for understanding the role of wind driven electrodynamics under varied space weather conditions. Sophisticated optical instruments like Fabry–Perot Interferometer (FPI) have been used to measure thermospheric winds by importing these instruments. The FPI has been developed and supplied by very few in the globe. Scientists at IIG took initiative to develop FPI under '**Atmanirbhar Bharat**'. Initial airglow observations of the nighttime thermospheric wind were made using a custom-built ground-based Table-Top Fabry–Perot Interferometer (FPI) at the Vainu Bappu Observatory of the Indian Institute of Astrophysics, Kavalur, Tamil Nadu (Figure 22). This marks the second successful effort to develop such an instrument, and the field data quality is notably high. The FPI has been precisely calibrated in the laboratory, with the finesse of the etalon determined to be approximately 94%, in agreement with manufacturer specifications (Figure 23). Two field campaigns were conducted, resulting in a robust dataset. Ongoing analysis focuses on evaluating thermospheric wind speeds and temperatures.

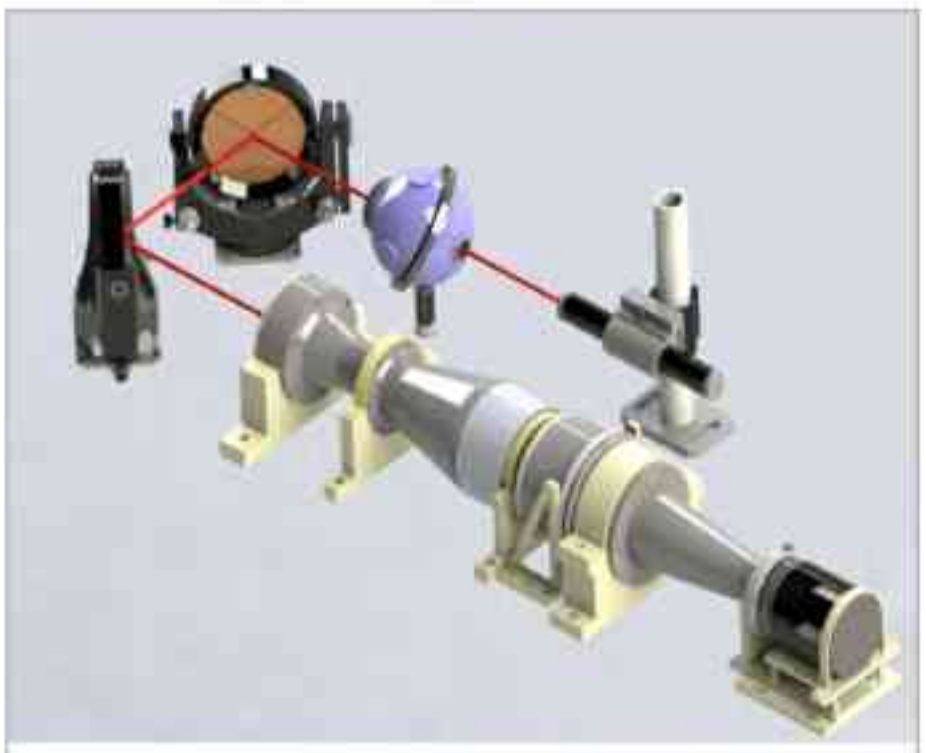

Figure 22 Schematic of the Table-Top FPI.

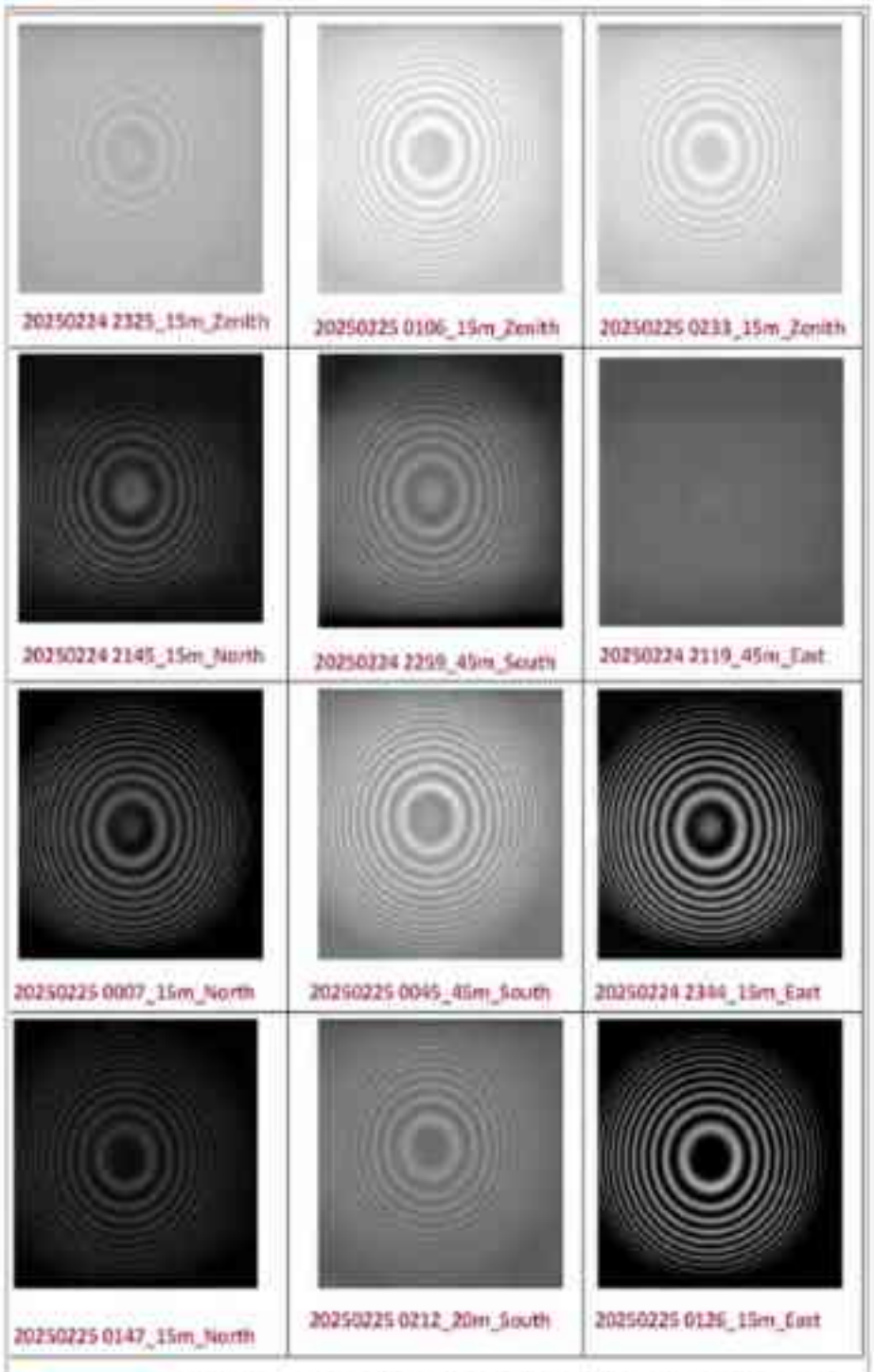

Figure 23 Airglow images (Year Month Date Time_Exposure Time_ Cardinal Direction)

Investigation of Ionospheric Alfvén Resonator (IAR) Signatures at Very Low Latitudes

Studies were conducted to explore the characteristics of Ionospheric Alfvén Resonator (IAR) signatures over very low-latitude regions in India, including areas close to the geomagnetic equator. The results indicate that IARs can indeed be detected in these low-latitude locations, although they typically exhibit a reduced number of harmonic structures compared to those observed at mid-latitudes. This behavior is attributed to the variability and structural complexity of the ionospheric cavity at equatorial latitudes, which influences the resonance conditions. These findings are significant as they demonstrate that the IAR phenomenon, long considered a mid-latitude feature, can also be manifested very close the equator under certain ionospheric conditions, thereby expanding our understanding of low-latitude ionospheric electrodynamics.

MAGNETOSPHERE-IONOSPHERE PLASMA DYNAMICS IN EARTH AND PLANETARY ENVIRONMENTS (MI- PEARL)

Chief Coordinator : Satyavir Singh

Coordinator : Amar Kakad

Members : Bharati Kakad, Remya Bhanu, S. Devanandhan, Chinmaya Nayak, B. Jayashree, T. Sreeraj and students

Lower hybrid and solitary waves in dusk flank region of the Earth's magnetosphere

A variety of plasma waves have been detected in the vicinity of the magnetopause by various spacecraft missions. Using the high-resolution data from the Magnetospheric Multiscale

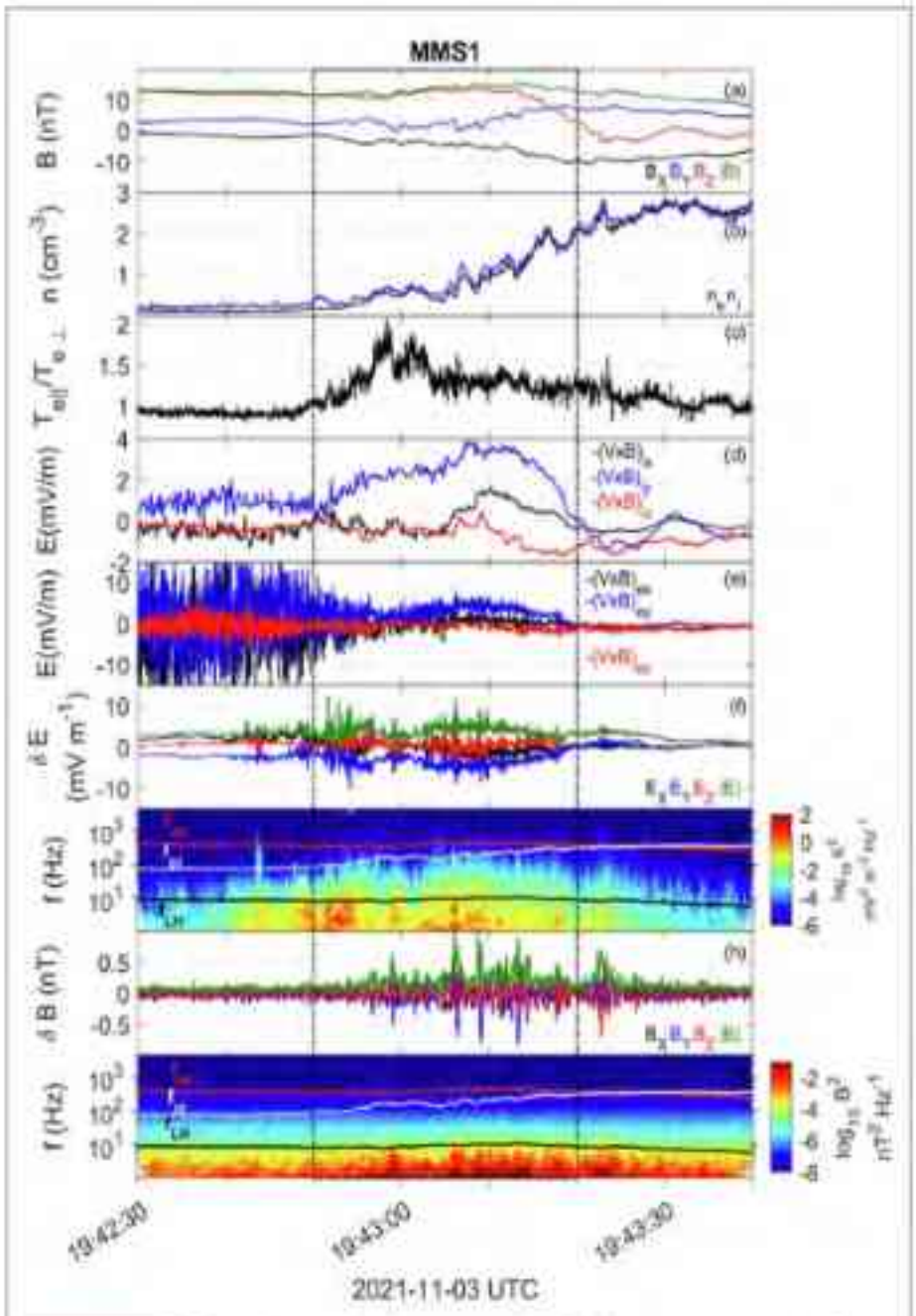

Figure 24 Overview of plasma and field measurements from MMS1 during spacecraft crossing. (a) magnetic field (B). (b) electron and ion density (n_e,n_i)and (c) parallel to perpendicular temperature ratio($T_{e\parallel}/T_{e\perp}$) of electron. (d) Ion convection electric field. (e) Electron convection electric field. (f) Fluctuations in the electric field, δE with f >1 Hz. (g) Spectrogram of δE. (h) Fluctuations in the magnetic field, δB with f >1 Hz. (i) Spectrogram of δB. The red, white, and black lines indicate electron cyclotron frequency, ion (proton) plasma frequency, and lower hybrid frequency.

(MMS) mission, a new observation of simultaneous lower hybrid and ion solitary waves in the dusk flank region of Earth's magnetosphere is reported. All four MMS spacecraft consistently observed this wave activity during their traversal from Earth's magnetosphere to the magnetosheath. The analysis suggests that the lower hybrid drift waves, driven by lower-hybrid drift instability, were observed in correlation with density gradients (Figure 24). Furthermore, the analysis indicates that the entire ion bulk population drifts, which drives ion solitary waves. It is found that these waves play a crucial role in particle heating in the dusk flank region of Earth's magnetosphere.

A novel theory of lower hybrid drift instability in nonthermal plasmas

Lower hybrid drift instability (LHDI) is driven by the cross-field current and operates in the vicinity of the lower-hybrid frequency, between the ion- and electron-gyro frequencies, and with wavelengths between the electron and ion thermal gyro radii. The free energy source that drives this instability resides in the density gradient associated with an inhomogeneous plasma. The existing literature on LHDI assumes that the charged particle distribution function is given by a Maxwellian form, but the space plasma is pervasively observed to feature nonthermal characteristics. A novel theory of LHDI in nonthermal plasmas is developed. This generalized theory of LHDI applies to various space plasma environments characterized by thermal and nonthermal plasma velocity distribution functions (Figure 25).

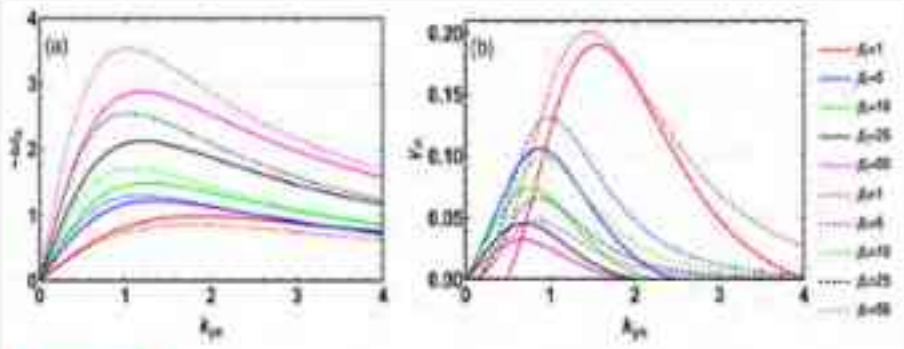

Figure 25 Normalized (negative) real frequency [Panel (a)] and growth rate [Panel (b)] of the LHDI vs the normalized perpendicular wavenumber for different ion plasma beta (β_i). The solid lines are for nonthermal plasma (κ=2) case, and the dashed lines are for thermal plasma (κ=50). Here, we consider the ion to electron mass ratio (m_i/m_e=1836), k_z=0 (90° wave propagation angle).

Effects of north magnetic pole drift on penetration altitude of charged particles

Space weather effects are controlled by the complex Sun-Earth interaction via magnetized solar wind. In most of the studies, only solar wind characteristics are examined to understand cause-effect relationship. It is known that geomagnetic field controls the charged particle motions in the near Earth environment. Over past one century, significant changes have been observed in the Earth's magnetic field due to secular variation. These slow changes in the magnetic field over several years, affects the dynamics of the charged particles that are trapped in the Earth's magnetic field. The simulation study carried out at IIG, revealed that the drift of the north magnetic pole (Figure 26) affects the penetration altitude of the energetic charged particles precipitating in mid-high latitudes. The penetration altitude of MeV-keV range protons are found to be increased by 400–1200 kms over Siberian longitudes. The forces arising due to changes in magnetic field gradients are responsible for higher penetration altitudes in the Siberian longitudes.

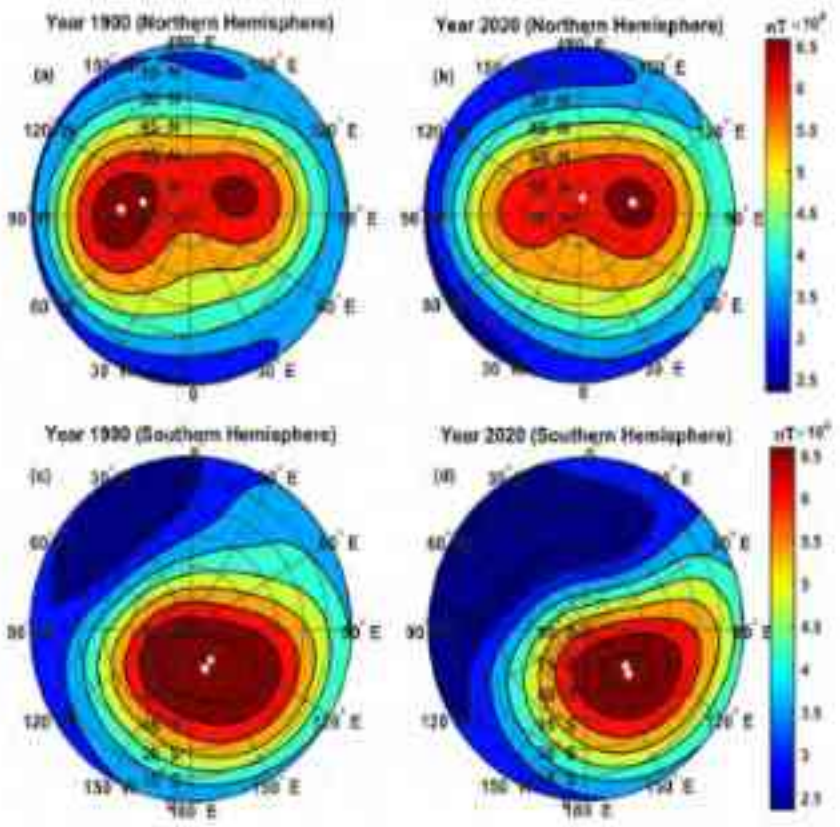

Figure 26 Orthographic projection of the surface geomagnetic field strength over the northern and southern hemispheres for years 1900 and 2020. Panels (a) and (b) represents northern, and panels (c) and (d) represents the southern hemisphere for 1900 and 2020, respectively. The color bar indicates the strength of the geomagnetic field in nano-Tesla. The white asterisk and dots represent the location of maximum magnetic field and magnetic pole for the respective years for respective hemispheres.

First Observation of Harmonics of Magnetosonic Waves in Martian Magnetosheath Region

Mars is an unmagnetized planet. The solar wind particles that bombard Mars continuously, are responsible for the loss of its atmosphere. This scenario is opposite to that of the Earth, as its strong intrinsic magnetic field forms a protective shield around the planet, called the

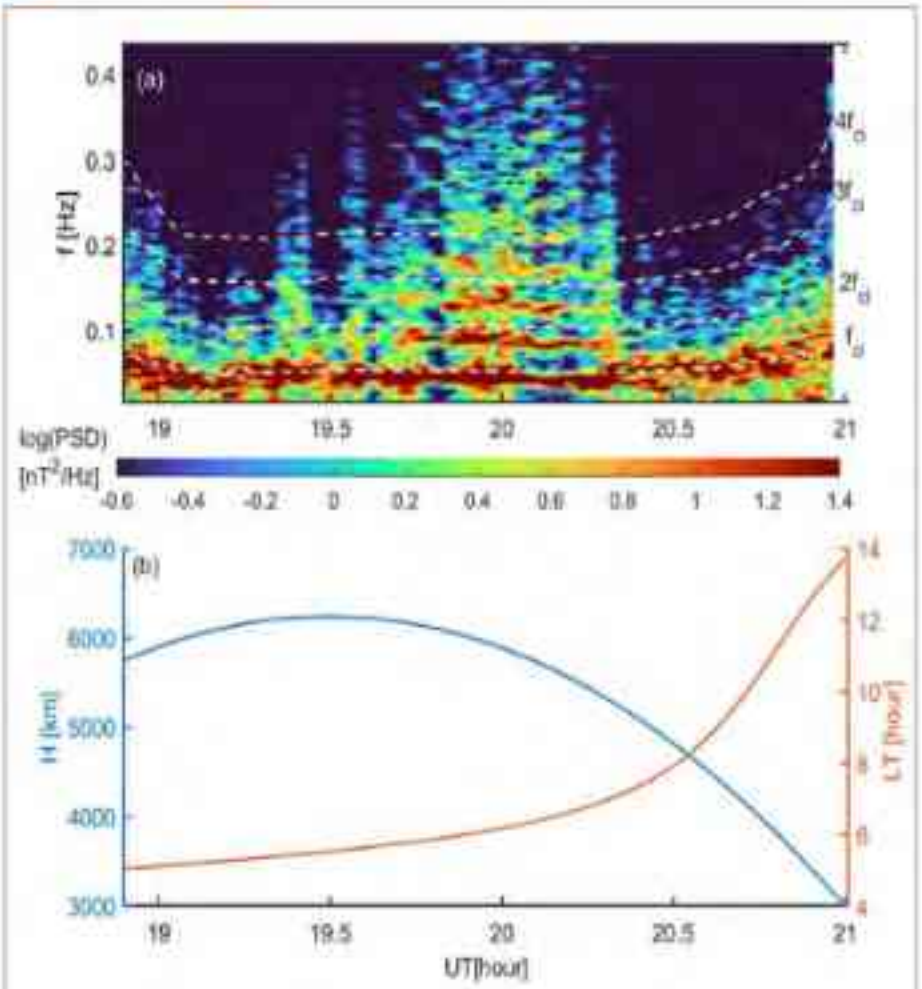

Figure 27 Panel-a shows the spectrogram of the total magnetic field on 21 February 2015, during 19.1–20.7 UT. The color scale shows the power spectral density of the total magnetic field in units of nT^2/Hz. The horizontal white dashed lines indicate the multiples of local proton gyro-frequency at f_{cp}, $2f_{cp}$, $3f_{cp}$ and $4f_{cp}$. The continuous wave activity below proton gyro-frequency is identified as fundamental mode of magnetosonic wave. While the multiple higher frequency modes are identified as magnetosonic wave harmonics. Panel-b shows the variation of altitude (blue color) and local time (red color) of MAVEN spacecraft during the observation of these low-frequency waves.

magnetosphere. Various electrostatic/electromagnetic waves are often generated in the Earth's magnetosphere, which are potential candidates for controlling the transfer of energy and momentum from one region to another. In case of Mars, it possesses a weakly induced magnetosphere, which is dynamic due to its continuous interactions with solar wind. IIG scientists have reported the first observations of the harmonics of magnetosonic wave in the Martian magnetosheath region (Figure 27). The magnetosonic waves are low-frequency compressive waves driven by the ions in the presence of the magnetic field. These waves are known to play a role in the particle heating process in the Earth's magnetosphere. Therefore, its observation in the Martian plasma environment is of interest to the scientific community to understand their role in plasma heating in the Martian ionosphere-magnetosphere system.

Ultra-relativistic charged particle dynamics in Jupiter's radiation belts

Jupiter possesses the most hazardous radiation belt in the Solar system, which contains ultra-relativistic protons (GeV), electrons (MeV), and heavier ions like (MeV) etc. Based on the energies and locations of the charged particles and the strength of local magnetic field, they either get lost or remain trapped in the Jupiter's magnetosphere. The trapped charged particles are expected to gyrate, bounce, and drift under the influence of a magnetic field. However, owing to their higher energies, these charged particles can exhibit non-adiabatic behavior. Many theoretical and simulation models often use the gyro-center approximation to study charged particle dynamics in various plasma environments. However, under non-adiabatic condition the applicability of such models is questionable. A simulation study indicates that when gyro-radius exceeds 1000 km, the charged particles follow non-adiabatic behavior (Figure 28). This new proxy can be used to determine the adiabatic and non-adiabatic regime of the charged particles trapped in the Jupiter's magnetic field, leading to a better understanding of Jupiter's radiation belts. The ability to distinguish between adiabatic and non-adiabatic invariants is vital for the improved predictions of the charged particle dynamics in the planetary and astrophysical plasma environments.

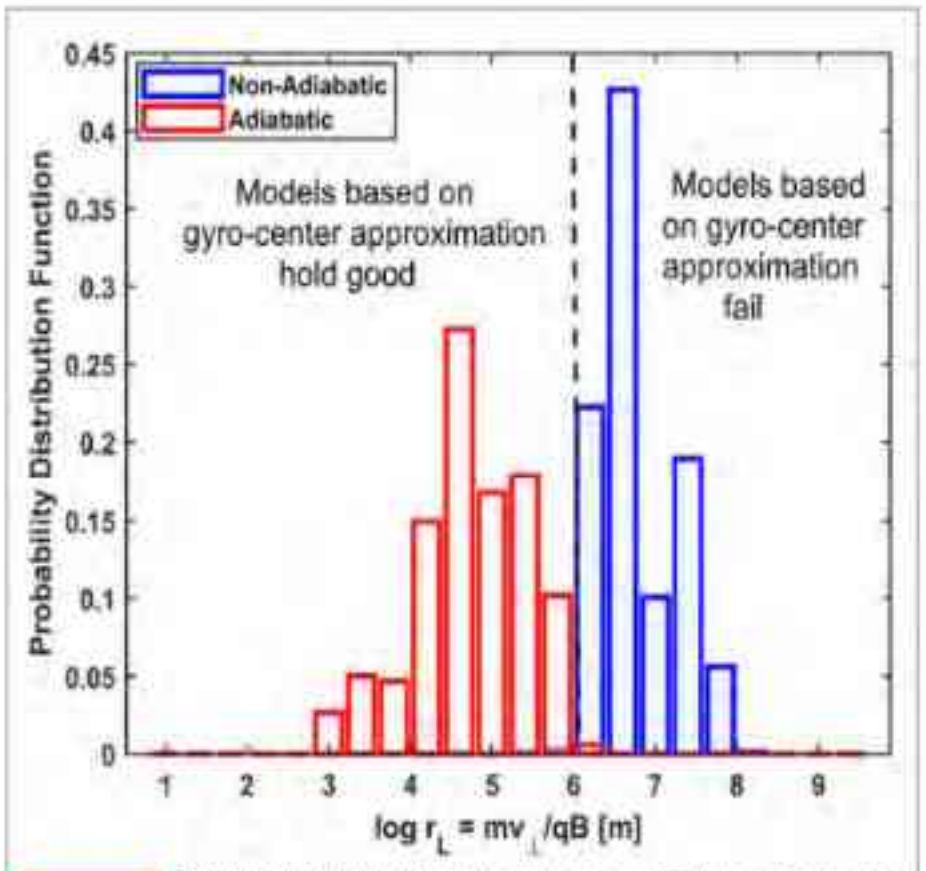

Figure 28 Probability distribution function of gyro-radius estimated by using simulation output of 47 runs, separately for adiabatic and non-adiabatic categories.

Magnetosonic Waves Excited by Maxwellian Ring Protons in Space Plasma Environment

A comprehensive theoretical model for a homogeneous plasma system of hot, tenuous Maxwellian ring-distributed protons and the cold background of Maxwellian ions and electrons is used to study the resonant instabilities of magnetosonic (MS) waves. The perpendicular velocity integrals associated with the Maxwellian ring distribution have no analytical solution, hence, are solved numerically, while the parallel velocity integrals are solved analytically by invoking series expansion of the plasma dispersion function. For the plasma parameters relevant to Earth's inner magnetosphere, the theoretical model generates MS waves with frequencies from 5 times the local proton cyclotron frequency to above the lower hybrid frequency for a propagation angle of 89.5°. Hydrogen (H^+) band electromagnetic ion cyclotron waves are also excited by the Maxwellian ring protons for the same set of plasma parameters. A detailed analysis reveals that a sufficiently large ring velocity, as well as a smaller perpendicular and parallel thermal velocity, can enhance the MS wave growth. The study also explores the role of background plasma parameters in modulating the waves. The present theoretical model reproduces the harmonics of the MS waves observed by the Van Allen Probes in the Earth's inner magnetosphere. Further, the model can generate MS waves in other plasma environments, e.g., Mars, where the presence of ring protons has been established by MAVEN in connection with the MS wave observations.

Magnetosonic Waves Driven by Maxwellian Ring Protons in the Martian Upper Ionosphere

Magnetosonic (MS) waves can be generated by hot Maxwellian ring protons locally within the Martian upper ionosphere, characterized by a weak ambient magnetic field and the presence of cold plasma abundant in heavier ions. A comprehensive study on the resonant instabilities of MS waves making use of the derived growth rates show that ring proton population with energies around 100 eV is optimal for wave generation. Highly oblique propagation leads to sharp harmonic structures at frequencies closer to local proton gyrofrequency. An increase in ring energy, electron plasma to cyclotron frequency ratio, and heavier ion concentration decreases the wave growth rates. When the background ions have very low temperatures, O_2^+ ions lower the growth rate more as compared to O^+ ions. Additionally, the increase in temperatures of cold electrons and ions have opposite effects, with the former increasing the growth rate and the latter decreasing it (Figure 29).

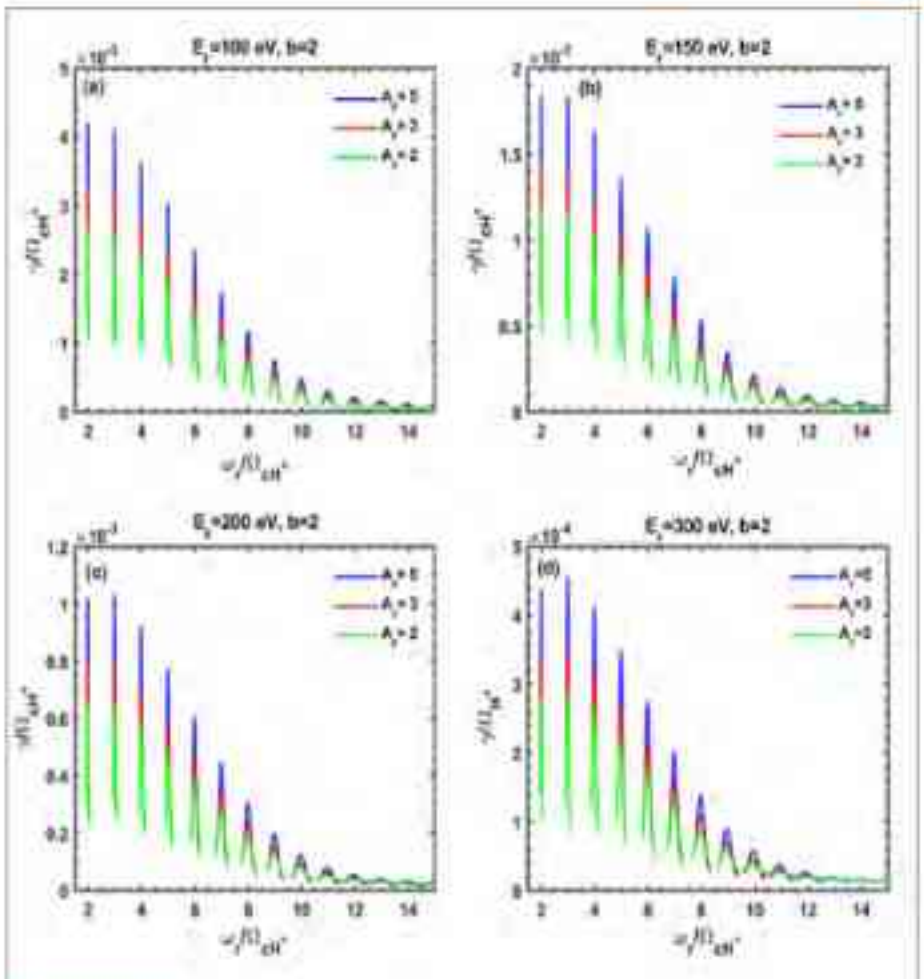

Figure 29 Normalized growth rate plotted against normalized real frequency for different values of proton ring energy Er as indicated on the panels (a–d). Effective anisotropy, Ar values are indicated by legends in each panel.

Observations of co-existing rising and falling tone emissions of electromagnetic ion cyclotron waves

Observations of co-existing rising and falling tone emissions of electromagnetic ion cyclotron (EMIC) waves observed by THEMIS E spacecraft are reported. The investigation of these fine structures of the EMIC waves is essential from the point of view of understanding the connection between the proton holes and the proton hills in velocity phase-space. The wave packets of rising and falling tones are tracked by Poynting vector analysis, which reveals that the rising tones are propagating northward and the falling tones are propagating southward. The nonlinear wave growth theory supports the observations. A model is proposed where the proton velocity distribution function evolves through the formation of proton holes on the negative side of the distribution function and mirrored resonant protons forming proton hills on the positive side of the distribution function, allowing to observe the co-existing rising and falling tone EMIC waves (Figure 30).

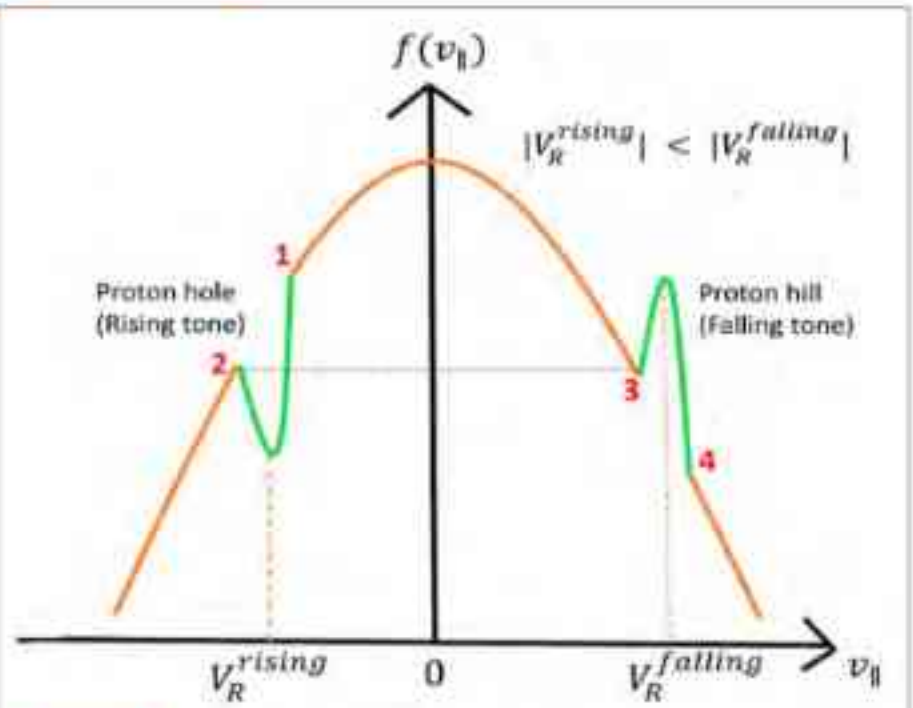

Figure 30 Schematic representation of proton velocity distribution function (f (v)). The proton hole (proton hill) at the left (right) side of distribution generates the rising tone (falling tone)

A comparative study of ion beam and velocity shear driven resonant instability of kinetic Alfvén waves with kappa-electrons

A comparative analysis is carried out between the ion beam and velocity shear as the possible source of free energy in the generation of kinetic Alfvén waves (KAWs) through a three-component theoretical model. The model consists of Kappa electrons, Maxwellian background ions, and drifting-Maxwellian beam ions as the constituent species. The ion beam and velocity shear-driven resonant instabilities of KAWs are investigated and the results are compared on a one-to-one basis. In the presence of electrons, velocity shear is found to be a more effective source of free energy as compared to ion beam in the generation of KAWs. The threshold value of both energy sources in the excitation of KAWs is found numerically for a fixed set of plasma parameters. The characteristics of KAWs such as real frequency, parallel and perpendicular wavelength range, wave unstable region, growth rate, etc. are examined for both cases and the results are compared with the observed values relevant to Earth's magnetotail.

A Mechanism for Slow Electrostatic Solitary Waves in the Earth's Plasma Sheet

An analysis of the Magnetospheric Multiscale (MMS) spacecraft data shows the presence of slow electrostatic solitary waves (SESWs) in the Earth's plasma sheet, which have been interpreted as slow electron holes (SEHs). An alternative mechanism based on slow ion-acoustic solitons is proposed for these SESWs. The SESWs are observed in the region where double humped ion distributions and hot electrons co-exist. The theoretical model considers the plasma in the SESW region to consist of hot electrons with a vortex distribution, core Maxwellian protons drifting parallel to the magnetic field, B and beam protons drifting anti-parallel to B. Parallel propagating nonlinear ion-acoustic waves are studied using the Sagdeev pseudopotential technique. The analysis yields four types of modes, namely, two slow ion-acoustic (SIA1 and SIA2) solitons and two fast ion-acoustic (FIA1 and FIA2) solitons. All solitons have positive potentials. Except the FIA1 solitons which propagate parallel to B; the other three types propagate anti-parallel to B. Good agreement is found between the amplitudes of electrostatic potential, the electric field, the widths and speed of SIA1 and SIA2 solitons, and the observed properties of SESWs by the MMS spacecraft.

Ionospheric response to May 2024 geomagnetic storm

The study explored how the topside equatorial and low-latitude ionosphere responded to the super geomagnetic storm on 10–11 May 2024, using in situ data from the Swarm satellite constellation. During the storm's main phase, intense EIA enhancements were observed, forming strong super-fountains. The EIAs were extended toward latitudes beyond 30° of the magnetic equator. The highlight of the study is that Swarm-A observed the strongest storm-time super-fountain during its entire age (2013-present) with nearly 500% increase in the crest density compared to the quiet-time conditions (Figure 31).

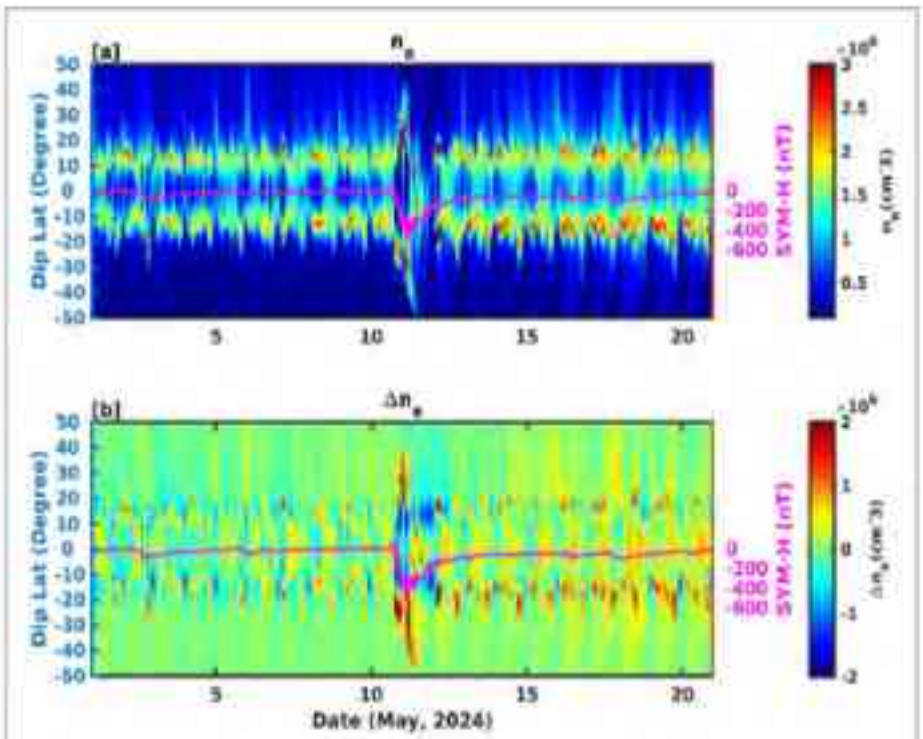

Figure 31 Latitude-time cross-section of electron density distribution during 01–21 May 2024 as seen through Swarm-A. The top and bottom panels show ne and Δne, respectively. The x-axis represents time (in terms of date). The left and right y-axes represent qD latitude and SYM-H index (in nT), respectively. The SYM-H index itself has been plotted by the magenta curve.

Magnetic reconnection in the Martian magnetosphere

Ion-acoustic solitary waves have been studied in the magnetic reconnection region of the Martian magnetosphere due to the interaction of fossil drapped fields with the solar wind. Superthermal population of O_2^+ ions and electrons along with O^+ ions and solar wind protons are considered in this study to model the MAVEN observations. The theoretical model could predict very low electric field amplitudes for the observed parameters. This work presents the pioneering results into the theoretical model for wave observations in the Martian magnetic reconnection region.

Electromagnetic ion cyclotron (EMIC) waves drivers governing the radiation belts dynamics

Understanding the drivers of Electromagnetic ion cyclotron (EMIC) waves are extremely important as they play a major role in governing the radiation belts dynamics. These waves are generally known to be generated when there is a large enough temperature anisotropy either by compression of the dayside magnetosphere due to solar wind pressure pulses or due to adiabatic heating of particles injected during geomagnetic storms or substorms from the night side. However, some EMIC events do not show any clear association with these known drivers and appear unexplained. An analysis of high-amplitude (>1 nT) non-storm time EMIC waves revealed that 24 out of 223 events (approximately 11%) with peak amplitudes greater than 1 nT were not associated with any identifiable EMIC wave driver. This raises a compelling question: what magnetospheric or solar wind driver provides the free energy to grow these quiet-time EMIC waves? An in-depth analysis of field and particle measurements from multiple datasets using multi-spacecraft and conjugate ground based observations provides with an understanding of what could have possibly driven these EMIC wave events under such extremely quiet magnetospheric conditions. The magnetosphere is found to be often close to instability threshold and any marginal flux or pressure enhancement is shown to drive these waves unstable.

MODELLING SPACE PLASMA PROCESSES IN GEOSPACE (M-SPICE)

Chief Coordinator : Remya Bhanu

Members : Bharati Kakad, S. Tulasiram, Research Students and Research Associates

Geomagnetic storm on 10 – 11 May 2024: Understanding causes and effects

A super-intense geomagnetic storm has occurred during 10-11 May 2024. This storm is ranked the second largest in the history of the space age and triggered a great interest in the scientific community. Scientists are puzzled by its global mean intensity surpassing the -500 nT mark, while the advanced MHD models could predict the storm intensity around -300 to -350 nT. It is shown that the storm intensity exceeded -600 nT over the Indian sector. The possible mechanisms for such a super-intense geomagnetic storm were demonstrated to be linked to strong solar wind dynamic pressure associated with a composite ICME structure. It is also shown that the magnetopause is pushed so close to the earth (~ 3.5 RE) and below the geostationary orbit (6.6 RE) continuously for more than 6 hours (Figure 32). Such a strong compression also pushed the Earth's magnetospheric bow-shock also to below 6.6RE for a few minutes. It is shown that the unique ICME structure with a potential combination of IEFY $\geq$ 2.5 mV/m and SWDP $\geq$ 15 nP a lasting for several hours lead to highly compressed dayside magnetopause and guiding the ring current much closer distances to the Earth. It is shown that the flow of ring current at unusually closer distances to the Earth is the key factor responsible for this super-intense geomagnetic storm.

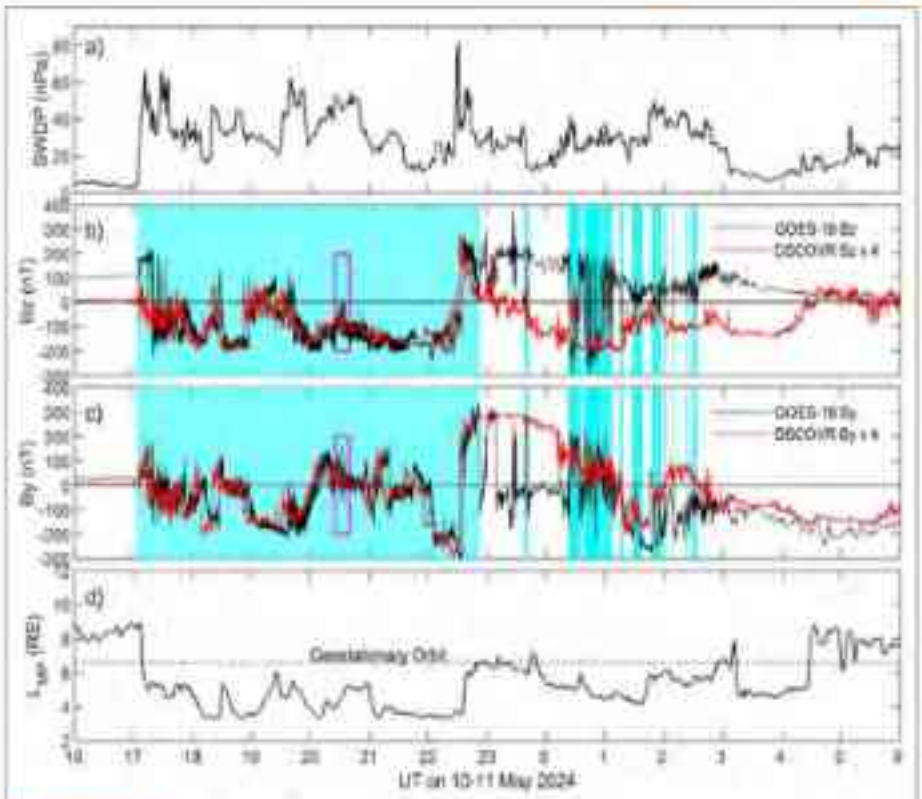

Figure 32 Severe compression of Magnetosphere with magnetopause pushed below the Geostationary orbit (6.6 RE) continuously for six hours on 10-May-2024 super-intense storm

Equatorial Electrojet (EEJ) field model

A new empincal Equatorial Electrojet (EEJ) field model is developed using nearly two solar cycles of EEJ observations from the Indian sector. The Method of Naturally Orthogonal Components (MNOC), also known as Principal Component Analysis (PCA), was employed to extract the

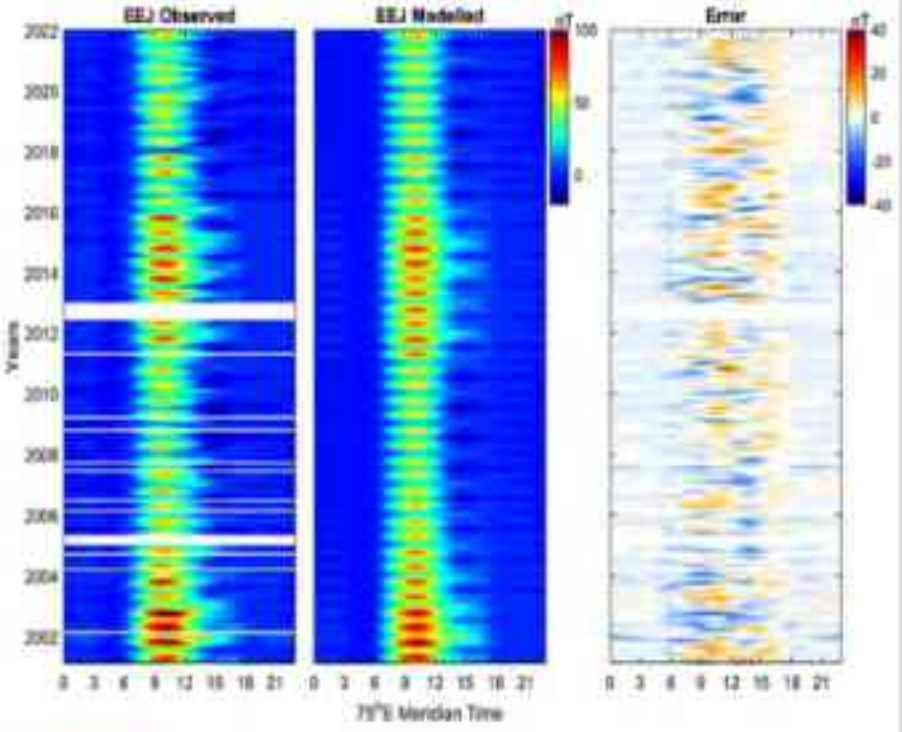

Figure 33 Comparison of Indian Equatorial ElectroJet (IEEJ) model results with the actual observations for two solar cycles. The small error in the right panel show cases the accuracy of the model.

dominant patterns of principal diurnal, semi-diurnal, and ter-diurnal components contributing to the EEJ variation. The amplitudes of these principal components, which vary significantly with the season and solar activity, are modeled by suitable bimodal distribution functions. Finally, the empirical model for EEJ field is being built by combining the principal components with their corresponding modeled amplitudes. This model is expected to accurately reproduce the diumal, seasonal and solar activity variations of EEJ including the seasonal and solar activity variations of Counter Electrojet (CEJ) (Figure 33).

An empirical relation was recently derived to estimate the EEJ response during the impingement of IP shocks which is primarily controlled by the change in PDyn and the local time [Nilam et al., 2023]. It is further understood that the angle of shock impact on the magnetosphere also play an important role on the EEJ response. Further investigations are being carried out on the role of shock impact angle. The results consistently show that the EEJ exhibits a heightened response to the shocks that head-on impact the magnetosphere (frontal shocks) than those with inclined impact (inclined shocks). The greater EEJ response during the frontal shocks could be due to a more intensified high-latitude convection electric field resulting from the symmetric compression of the magnetosphere. Finally, the existing empirical relation involving PDyn and local time is being improved by including the effects of impact angle, which can quantitatively predict the EEJ response to IP shocks (Figure 34).

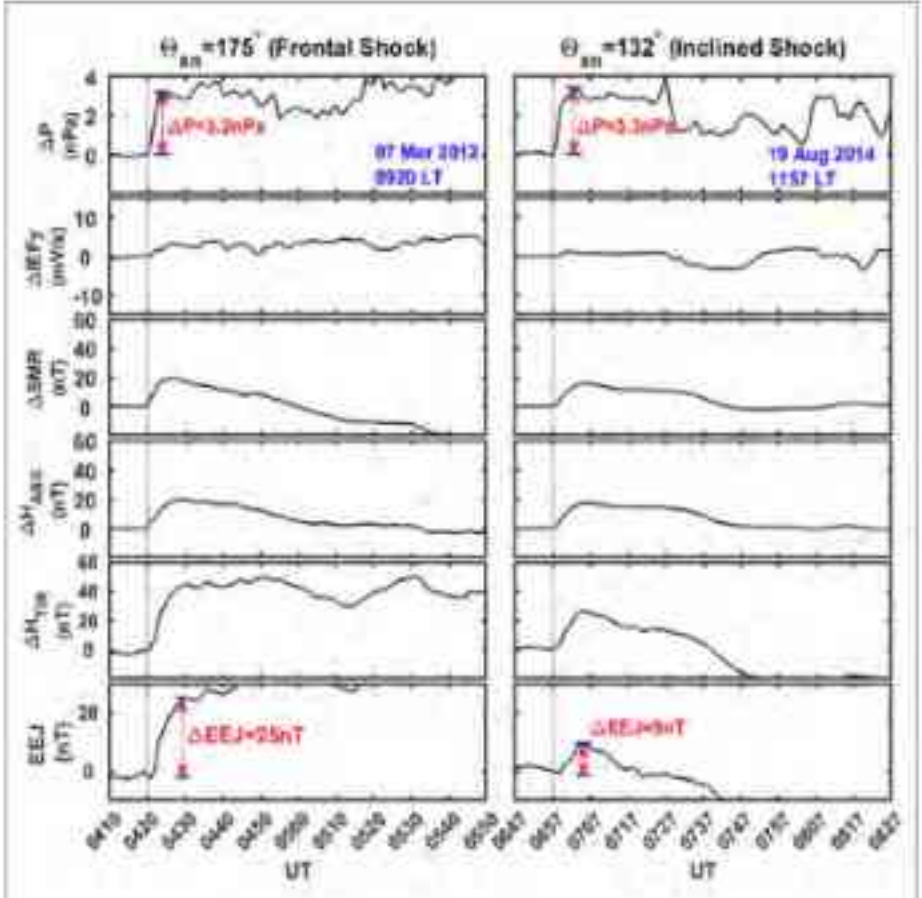

Figure 34 Equatorial Electrojet (EEJ) response to the impact of a Frontal shock and an inclined shock, revealing the role of IP shock impact angle on the EEJ response.

Charged particle motions in the Earth's magnetosphere and related particle loss to the atmosphere

Simulation codes to model charged particle motions in the Earth's magnetosphere and related particle loss to the atmosphere is developed. It is a test particle simulation code to track particle motions in the Earth's magnetic field and to compute their loss to the atmosphere. The code is written in MatLab and has eight subprograms. IGRF coefficients for any year starting from 1990 till 2020 (as available) can be used, and a particle motion in the Earth's magnetosphere can be visualized for that particular year. This simulation code is available at https://doi.org/10.5281/zenodo.13684948

SOLAR FORCING ON LOWER ATMOSPHERE (SOLAR)

Chief Coordinator : B. Jayashree

Members : A.P. Dimri, Chinmay Kumar Nayak, B. Remya, Rajendra Singh Rawat, T. Sreeraj, Abhishek Kumar, Vasundhara Barde, and Amrita Yadav

Long term influence of solar cycle and geomagnetic activity on stratospheric winter temperatures

In this research, long term impact of solar forcing in terms of sunspot number and geomagnetic activity is checked on

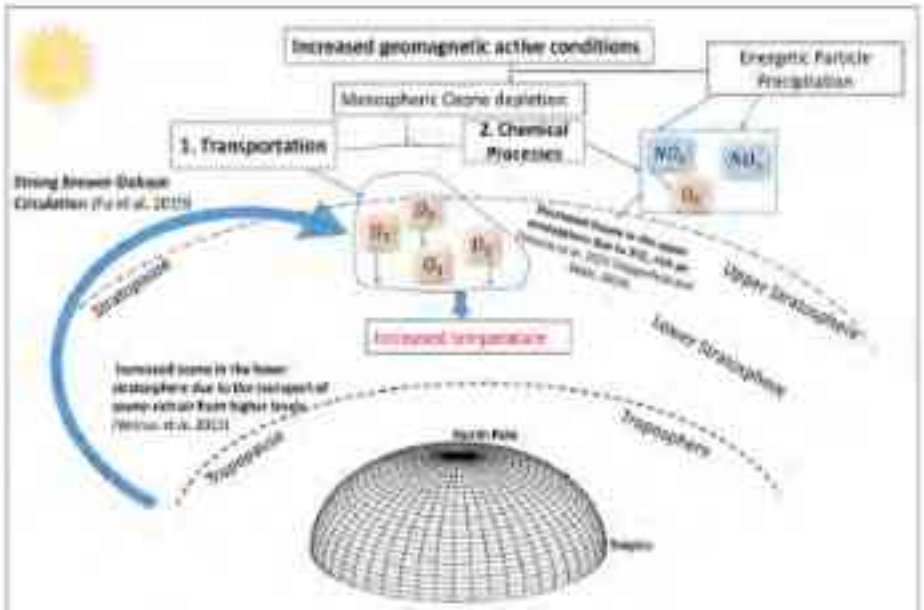

Figure 35 Schematic diagram for the mechanism of stratospheric polar warming during long term active geomagnetic condition

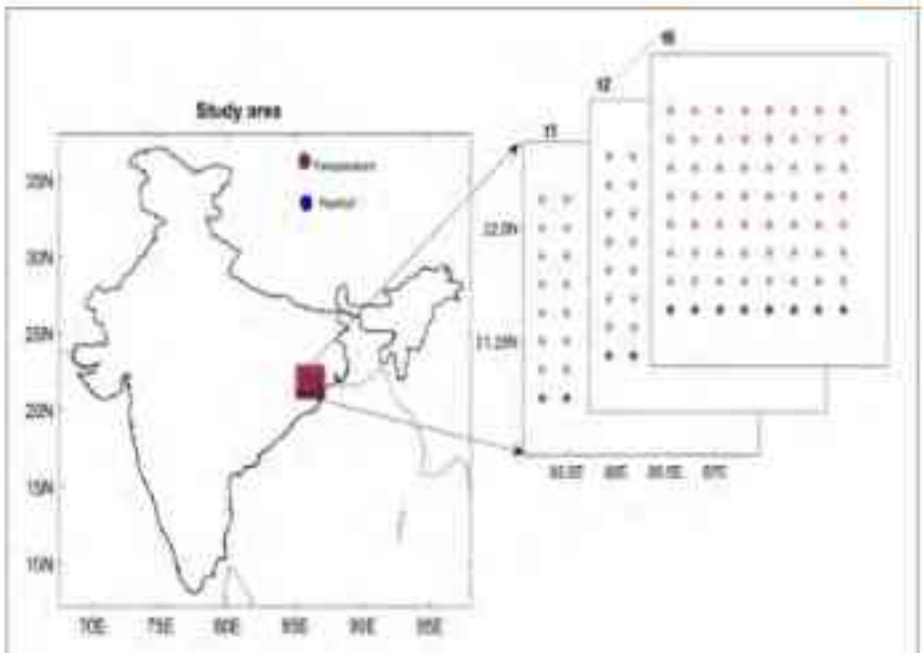

Figure 36 Study area considered for the analysis of chaotic patterns in ISMR using Echo State neural network

the 10 hPa stratospheric winter temperature. It is observed that during 1960-2000, there is enhancement in both the number of geomagnetic storms and the 10 hPa winter temperature and lower stratospheric ozone. In addition, it is observed that the shallow branch of the Brewer Dobson Circulation (BDC) in the lower stratosphere is intensified during this period, and resulted in the downwelling in the lower stratosphere in the Arctic. Consequently, ozone was redistributed toward lower stratospheric altitudes, while depletion occurred in the upper stratosphere, likely driven by enhanced geomagnetic activity. This redistribution was accompanied by an increase in wintertime stratospheric temperatures, attributable to the radiative effects of elevated ozone concentrations at lower altitudes (Figure 35).

Predicting Indian Summer Monsoon Rainfall is a challenging task because it is highly variable. This study uses machine learning to better recognize the complex chaotic patterns in ISMR, using a type of data called ERA-interim. Apply a mathematical model called the Lorenz-96 model to daily rainfall data and train it using a neural network called an Echo State Network. This method can identify patterns in ISMR with up to about 1 model time unit, which is slightly less accurate compared to its performance in predicting other systems. This difference may be due to the complexities of the data used and the training process, which involves 500 initial conditions. Importantly, this approach is successful in predicting ISMR accurately in slightly over 50% of cases. While it has some limitations, this method shows promise in helping to recognize the chaotic behaviour of ISMR and may be used in improving monsoon forecasting techniques in future (Figure 36).

Gridded Geomagnetic Field Map of India

A unique two-dimensional gridded geomagnetic map of India is constructed using the geomagnetic field observations from 11 observatories of India, operated by the Indian Institute of Geomagnetism. In order to create the spatial grid, 11 spatial techniques are compared with observed magnetic field during 2011–2020. Out of the 11 known techniques of spatial interpolation, the Modified Shepard's Method is selected as the best suitable method for interpolation. The spatial gird provides the hourly values of absolute and variations in horizontal (H) and vertical (Z) magnetic field over India. The spatial grid can be applied to higher temporal resolution of data sets as well. This map

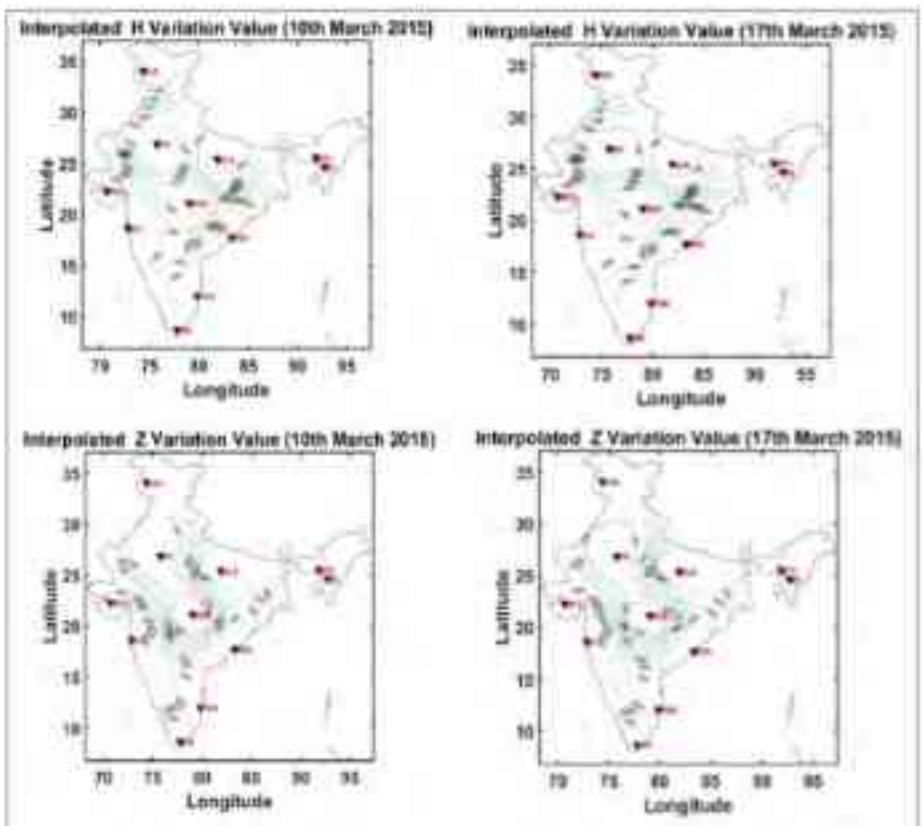

Figure 37 Gridded magnetic field components (a) H and (b) Z for the year 2011 and 2017

can be used to get the regional changes in the magnetic field during quiet and disturbed conditions. A user-friendly MATLAB based GUI is created for obtaining the spatial grid (Figure 37).

Impact of active geomagnetic conditions on polar stratosphere and upper troposphere

During active geomagnetic conditions, a large amount of energy is deposited in the polar atmosphere in the form of particle precipitation that leads to Joule heating creating circulation of intense currents in the auroral region. It can affect the existing background pressure fluctuations in the stratospheric and tropospheric heights, leading to anomalous changes in the vertical temperature (T), zonal (u) and meridional (v) wind. Composite analysis of T, u and v reflects that the temperature shows an increase in the entire atmospheric column; the anomalies in u (u') and v (v') show a regional dependence and strengthen in their amplitudes (Figure 38).

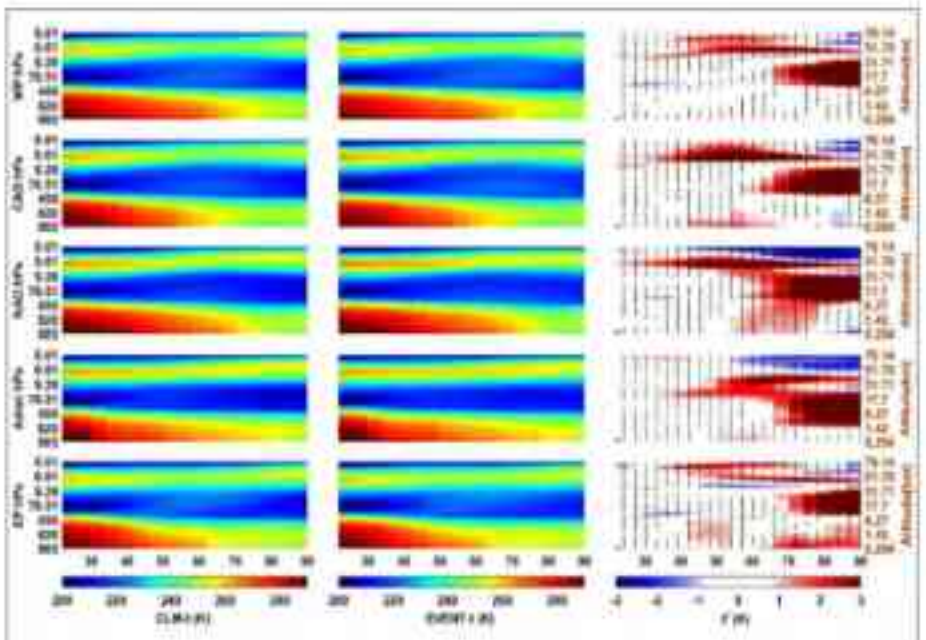

Figure 38 Pressure Level-Latitude variation of zonal wind: climatology t (CLM-t) in left panels, active condition u (Event-u) in middle panels and its composite (u') in right panels for different longitudinal sectors indicating Ocean and land. WP: western Pacific, CAD: Canadian Sector, NA: Northern Atalantic sectors, Asian: Asian Sector and EP for East Pacific sector. A total of 99 active geomagnetic conditions in March during 1990-2020 are included in this picture. The black dots indicate significance values obtained from student t test at 95%.

SOLID EARTH RESEARCH

GEOPHYSICAL STUDIES OVER NORTH EAST REGION AND DECCAN TRAPS (GEONET)

Chief Coordinator : S.P. Anand

Coordinator : Shantanu Pandey

Members : Gautam Gupta, P.B.V. Subba Rao, Anup Sinha, Ramesh Nishad, Amit Kumar, Purushotham Rao, Rabin Das, Nongmaithem Menaka Chanu, B.N. Shinde, Ganpat Surve, M. Ponraj , Nava Kumar Hazarika, Sujit K. Pradhan, M. Laxminarayana, Awadhesh K. Prasad, Abilash K.S., E. Karthikeyan, Ajish P. Saji, Srinivas Nayak, G. Shailaja, K. Tahama

This program is a comprehensive research initiative structured into four interrelated sub-programs, each addressing distinct yet complementary geoscientific objectives.The first sub-program employs an integrated suite of geophysical techniques—including gravity, magnetic, magnetotelluric, Very Low Frequency Electromagnetic (VLF-EM), and Electrical Resistivity Tomography (ERT)—to characterize the shallow to deep subsurface features across the Kopili Fault Zone (KFZ), a seismically active region in North-East India.The second sub-program focuses on constructing an advanced lithospheric and geodynamic model using cutting-edge seismological methods such as tomography and receiver function analysis. Complemented by geodetic observations, this effort aims to constrain crustal deformation patterns and fault frictional properties. With support from the expanding network of Broadband Seismometers and GNSS stations, the program seeks to enhance the understanding and assessment of seismic hazards in this tectonically complex region.The third sub-program targets the identification of sub-basalt structures within the Deccan Volcanic Province, particularly along the western coast and adjoining continental shelf. By analysing gravity and magnetic data, it aims to improve imaging beneath thick basalt cover, a long-standing challenge in Indian geophysics. The fourth sub-program investigates the environmental impact of rapid urbanization and industrialization through the study of magnetic pollutants in and around Prayagraj. This component provides critical insights into emerging environmental challenges using environmental magnetism techniques.Together, these sub-programs reflect GeoNET's interdisciplinary approach to addressing key geophysical, tectonic, and environmental issues across diverse Indian terrains.

Development of 3D Seismic Velocity Model in North-East India Using Ambient Noise Tomography

Under this science program, a network of 12 broadband seismic stations has been established across North-East India. The distribution includes four stations in Assam (Bongaigaon, Silchar, Diphu, and Jorhat), four in Arunachal Pradesh (Dirang, Pashighat, Ziro, and Namsai), and one station each in Meghalaya (Shillong), Tripura (Agartala), Mizoram (Aizawl), and Manipur (Imphal). This initiative aims to develop a comprehensive velocity model of the region by employing a combination of techniques such as noise tomography, travel-time tomography, and surface wave tomography. Utilizing multiple methodologies allows to capitalize on the strengths of each approach while mitigating their individual limitations. One key focus is the analysis of seismic ambient noise through surface wave methods, which provides critical insights into the crustal and uppermost mantle structures at various scales—something that traditional surface wave dispersion methods struggle to achieve due to issues like scattering and attenuation. The fundamental mode of Rayleigh waves, extracted from Green's functions between station pairs using long-term ambient noise recordings, forms the basis for tomographic imaging. Ambient Noise Tomography (ANT) is currently being conducted using data collected by IIG's seismic network in the region. The project is in the advanced stages, with final refinements underway for the 3D velocity model.

Seismic Velocity Structure of North-East India from Travel-Time Tomography

North-East India, situated in seismic Zone V, lies at the triple junction where the Indian plate converges with the Eurasian and Burmese plates, making it highly prone to damaging earthquakes. To illuminate the geodynamic drivers of this seismicity, a 3-D P- and S-wave travel-time tomography using the LOTOS algorithm was performed. The inversion incorporates 31120 high-quality phase arrivals from 2588 earthquakes (20°N–30°N, 88°E–98 °E) recorded by 37 stations between April 2011 and May 2023, drawing on datasets from the National Centre for Seismology and the Indian Institute of Geomagnetism. The resulting velocity models, well resolved down to ~70 km depth, refine event locations and reveal distinct structures: high-velocity bodies beneath the Shillong Plateau and Mikir Hills, low-velocity anomalies beneath the Indo-Burma Ranges, and a pronounced low-velocity zone adjacent to the Kopili Fault.

Tracing Ultrafine Pollutants in Prayagraj through Magnetic and Microscopic Techniques

The pollution hotspots in Prayagraj was examined by analyzing road and leaf dust samples. Elevated magnetic susceptibility values indicate ultrafine pollutants (<0.03 μm) primarily from vehicular and industrial sources. Scanning Electron Microscope (SEM) and Energy Dispersive X-ray Spectroscopy (EDX) analyses confirm heavy metal contamination (Fe, Co, Pb). Road dust shows higher susceptibility than leaf dust, reflecting both natural and anthropogenic sources. Statistical and spatial analyses highlight the impact of urbanization on pollutant distribution. The findings provide critical data for environmental monitoring, public health assessments, and pollution mitigation strategies.

Evaluating Sub-Basalt Imaging Using Synthetic Gravity and Magnetic Models

To assess the efficacy and sensitivity of potential field data in sub-basalt imaging, synthetic models replicating the geological setting of the west coast of India and the adjoining continental shelf were constructed. The primary objective was to evaluate how varying basalt (trap) thickness influences the detection of sub-basalt structures and basement features under different subsurface scenarios. Additionally, the study investigated the effectiveness of various interpretation techniques in identifying intrusive bodies at varying depths. The gravity and magnetic responses generated from these synthetic models were used to design filters aimed at attenuating the dominant signatures from the basalt cover. These filters can subsequently be applied to real field data to enhance the imaging of the underlying basement. Preliminary results indicate that while the basalt layer significantly affects the observed potential field response, basement signatures remain partially discernible and can be enhanced through carefully designed filtering techniques.

Corrosivity Risk and Hydrochemical Characterisation of Groundwater in Eastern Maharashtra

Groundwater quality in the Mann River basin, eastern Maharashtra, was evaluated for its suitability in drinking, agriculture, and industry. Analysis of 43 samples from bore wells and dug wells assessed key hydrochemical parameters, comparing results with WHO and BIS standards. Piper and Gibbs diagrams indicate rock-water interactions with a dominant $CaMgHCO_3$ facies. While 52% of samples qualify as excellent drinking water, irrigation assessments

suggest most samples are suitable for agriculture. However, industrial suitability assessments reveal a high risk of corrosion. GIS-based corrosion mapping provides valuable insights for effective groundwater monitoring and management.

Geophysical Investigation of Land Subsidence and Hazards in Joshimath, Himalayas

Joshimath, located in the geologically sensitive Himalayan region, is undergoing significant land subsidence driven by a combination of natural processes and anthropogenic activities. To evaluate the subsurface conditions and assess associated hazards, a comprehensive multi-instrumental geophysical survey was conducted, incorporating Electrical Resistivity Tomography (ERT), magnetic susceptibility analysis, and ground magnetic surveys. The ERT data delineated weak zones characterized by high water saturation, indicating potential pathways for subsurface fluid movement. Complementary magnetic susceptibility and ground magnetic measurements revealed evidence of structural instability and lithological contrasts. Together, these results provide critical insights for hazard assessment and inform strategies for sustainable development and risk mitigation in Joshimath and other similarly vulnerable regions across the Himalayas.

GEOSCIENCE AND APPLICATIONS PROGRAM (GAP)

Project Investigator (IIG) : Anand, S.P.

Members : Ajish P. Saji, Eleazer Wanniang

Project Investigator : K.M. Sreejith, SAC (ISRO)

Geosciences and Application Program (GAP), is a multi-institutional program funded by Space Application Centre (SAC-ISRO, Ahmedabad, where inIIG, SAC-ISRO and Cochin University of Science and Technology, aims to study crustal deformation in the Eastern Himalaya region. As part of this project, 15 Global Navigation Satellite System (GNSS) stations (Figure 39) were established across Arunachal Pradesh and Assam during the period from November 2022 to June 2023. Of these, eight stations are currently operating as Continuously Operating Reference Stations (CORS), while the remaining function as campaign-mode (survey-mode) GNSS stations. Regular field campaigns are being conducted for data retrieval and maintenance of the CORS stations. Additionally, the survey-mode GNSS stations are periodically re-occupied for repeat observations. The collected data are archived and converted to standard RINEX format for subsequent processing. Preliminary data

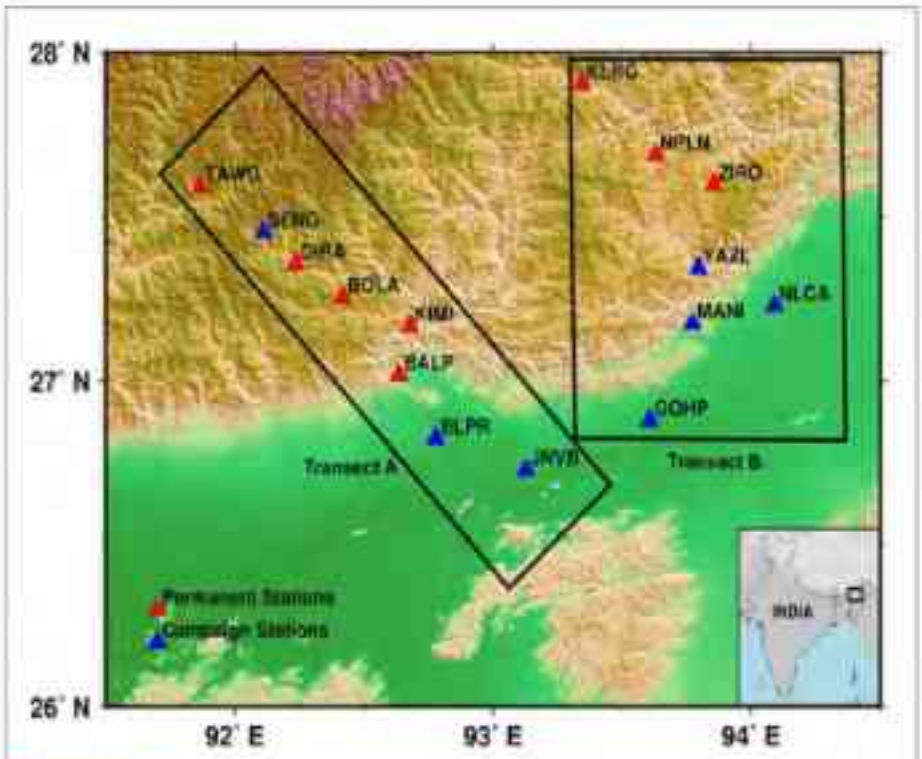

Figure 39 Map showing locations of GNSS stations established under the GAP project.

processing has been completed for GNSS observations acquired during 2022, and daily solution time series were estimated.

PALEOMAGNETIC APPROACH FOR GEOMAGNETIC EXCURSIONS, PALEOINTENSITY, PALEOLATITUDE AND PALEOCLIMATE RECONSTRUCTION (Ge3P)

Chief Coordinator : B.V. Lakshmi

Coordinator : Priyeshu Srivastava

Members : K. Deenadayalan, Ramesh K. Nishad, Anup K. Sinha, Sujit K. Pradhan, E. Karthikeyan, Gautam Gupta, Research Associate, Research Scholars and Project staff

Estimating the absolute geomagnetic field intensity from Indian archaeological artefacts is crucial, as the long-term variations of the Earth's past magnetic field components remain largely unknown for this region. Archaeomagnetic and rock-magnetic analyses of Vadnagar, Gujarat artefacts, produced seven new archaeointensities values ranging from 33.58 ± 2.0 to 43.37 ± 1.9 μT. The new intensities were combined with existing data to construct India's first Palaeosecular variation (PSV) curve, spanning 2250 BCE to 2000 CE, at the geographical Centre of India (20.5937° N, 78.9629° E), using two distinct modelling approaches (Figure 40). The first approach uses a bootstrap algorithm, generating smooth intensity variations, whereas the second employs a transdimensional Bayesian framework, resulting in sharper variations with occasional increases in amplitude.

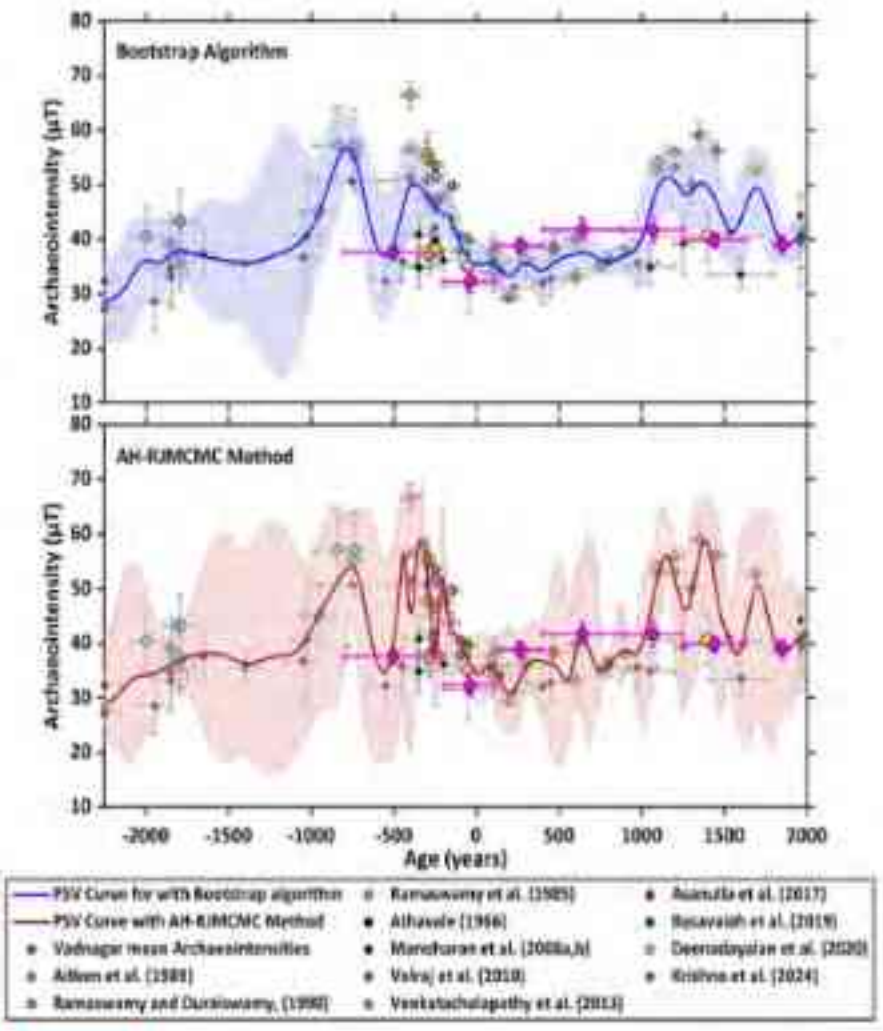

Figure 40 Palaeosecular variation curve for India constructed by using Bootstrap algorithm and Transdimensional Bayesian algorithm (AH-RJMCMC method).

The PSV curve derived from the bootstrap algorithm was compared to global models and showed precise temporal alignment only between 400 BCE and 200 CE. The PSV curve developed using the bootstrap algorithm was compared with global models, showing precise temporal alignment only from 400 BCE to 200 CE. This highlights the need for additional reliable archaeointensity data from dated artefacts to provide a comprehensive understanding of past geomagnetic field intensity changes and local variations in India.

Archaeomagnetic studies were undertaken on seventeen individual artefacts collected from Lothal historical site, Gujarat. A detailed rock-magnetic study was conducted on individual Lothal artefacts, identifying suitable samples for calculating past geomagnetic field intensity. Archaeointensity analyses using the Thellier-Thellier technique enabled the determination of past geomagnetic field intensity from the artefacts (Figure 41). A new corrected mean archaeointensity value of 34.88 ± 1.4 μT (Banc) has been calculated for the Lothal site (1850 ± 100 BCE). The new geomagnetic intensity values included the Indian paleosecular variation curve.

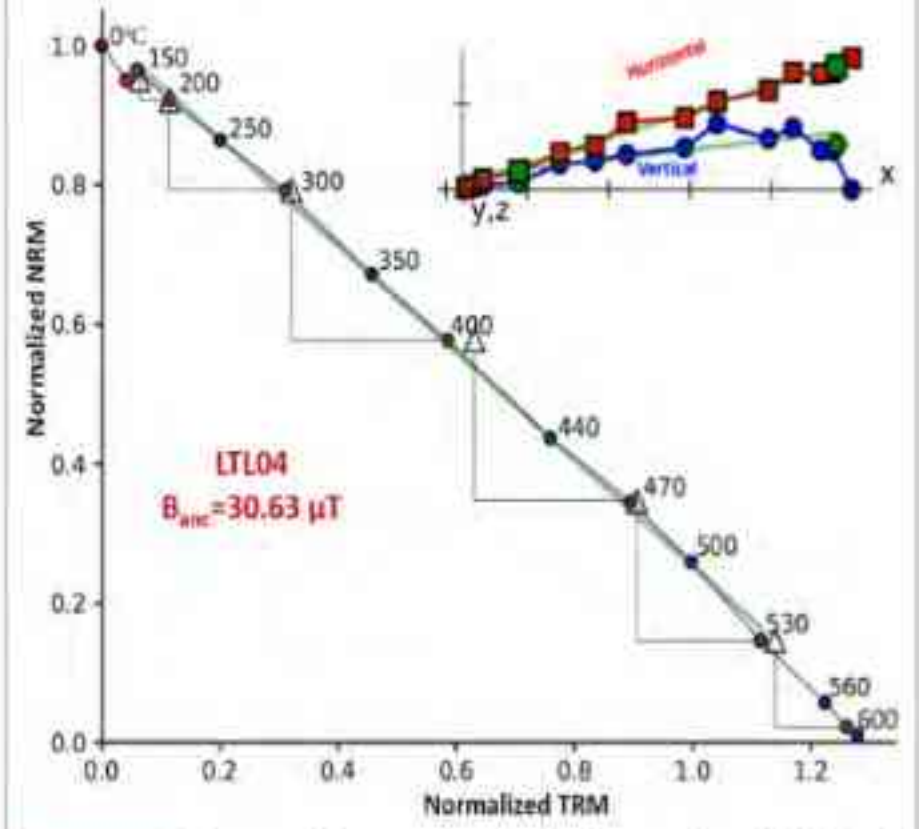

Figure 41 Representative archaeological sample (LTL04) of successful Thellier and Thellier experiment with Arai plot and Zijderveld diagram.

Anisotropy of magnetic susceptibility (AMS) study to understand the magma flow pattern of dyke swarms

Investigated the significance of magnetic fabrics to provide information on their mode of emplacement and to understand magma flow direction. Three types of AMS fabrics were recognized based on the clustering of the principal AMS axes. The results suggest that the dykes may be closer to the magma source, and horizontal magma flow inferred from the dykes reveals source is located further away. The present AMS study along with geophysical, geochemical and petrological study supports the evidence of feeder fed mechanism.

A combined tectono-climatic control on Holocene sedimentation in Ladakh Himalaya, India: Clues from AMS of lake sediments

The depositional environment of the 27.8 m thick Spituk palaeolake sedimentary sequence was evaluated using the AMS technique to assess the relative influence of climatic factors and tectonic processes in shaping the landscape of this sector of the Himalayan Mountain Chain (HMC). The results indicate that Holocene sedimentation within the LGP 1 and LGP 2 sectors of the Spituk Palaeolake Sedimentary Sequence (SPSS) was predominantly governed by a lacustrine regime, as evidenced by the prevailing prolate

geometry of the AMS ellipsoids (Figure 42). The distribution of AMS K_{min} and K_{max} axes suggests that a SE-NW flow

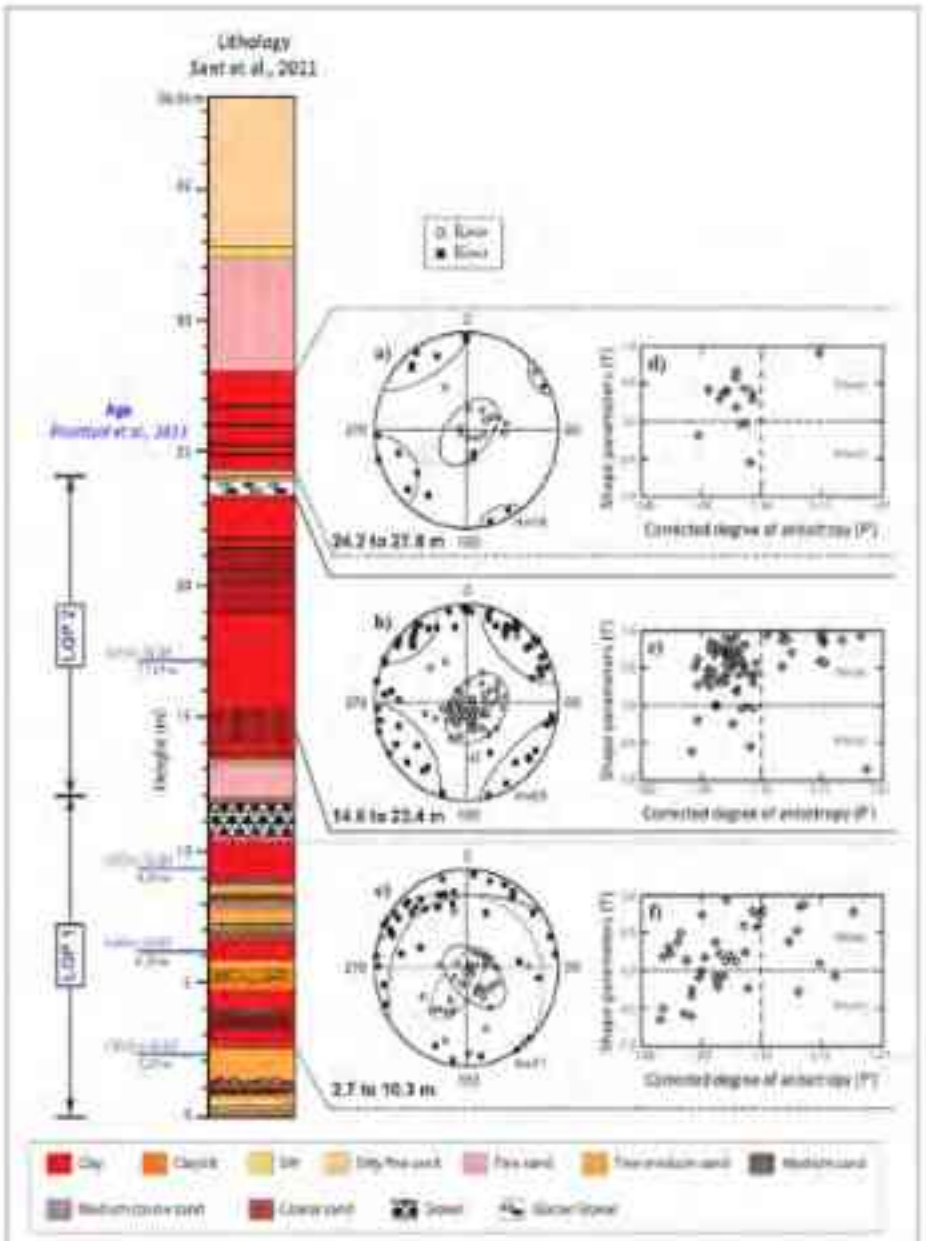

Figure 42 Representative Composite lithology plotted together with equal area projections (lower hemisphere) of the directions of Kmax (solid squares) and Kmin axes (open circles) of AMS ellipsoids subdivided for the samples from (a) 2.7-10.3 m, top (b) 14.6-23.4 m, middle and (c) 24.2-27.8 m, bottom. The spreads in orientations of Kmax and Kmin axes are qualitatively indicated in the stereograms. Variation of corrected degree of anisotropy (P') and shape parameter (T) for different depths from (d) 2.7-10.3, top (e) 14.6-23.4, middle and (f) 24.2-27.8, bottom. Mean Calendar ages from four heights, at ~2.25 m (12572±90), ~6.20 m (7368±59), ~9.35 m (6885±88), and ~17.15 m (3473±77) ve archaeological sample (LTL04) of successful Thellier and Thellier experiment with Arai plot and Zijderveld diagram.

was important for the LGP 1 sequence, whereas a SW-NE flow characterised deposition of LGP 2. The relatively strong flow regime within an otherwise lacustrine-dominated environment is interpreted as a result of a rare, rapid deglaciation event and the associated glacio-fluvial discharge driven by climatic warming. The gravel bed (~ 1 m thick) demarcating the upper limit of the LGP 1 sequence represents deposition of boulders from the Zanskar Range during a period of deglaciation, whereas the glacial gravel bed (~0.8 m thick), indicating the termination of the LGP 2, reflects tectonism affecting the Ladakh Range (Figure 42). This study confirms previous observation that climatic and tectonic factors were both responsible for the deposition of the late Quaternary sedimentary sequence of the Himalaya. However, the gravel bed at the top of LGP2 occupies only ~2.8 vol% of the studied section of the SPSS in the present study, indicating climate-dominating growth of the SPSS section.

Magnetic fabric characteristics of earthquake induced deformation features around Dauki region, Shillong Plateau, India

AMS measurements for seismites were carried out at four sites in and around Dauki Fault, Shillong Plateau to define characteristic AMS fabrics of seismites. Rock magnetic measurements show that the magnetite and hematite minerals contribute to AMS fabric. It is observed that seismites are characterised by triaxial to prolate fabric shape with low shape parameter and high magnetic lineation values whereas, undeformed sediment layers show oblate shape (Figure 43). The N-S orientation of Kmax is well developed at all the sites and it is aligned perpendicular to the E-W trending Dauki Fault, suggesting extensional setting. Further, the inferred extensional magnetic lineation from the present study is compatible with the normal faults under extensional stress conditions, predicted by earlier studies in Shillong Plateau. The AMS technique contributes significantly to paleoseismic records for characterising seismites.

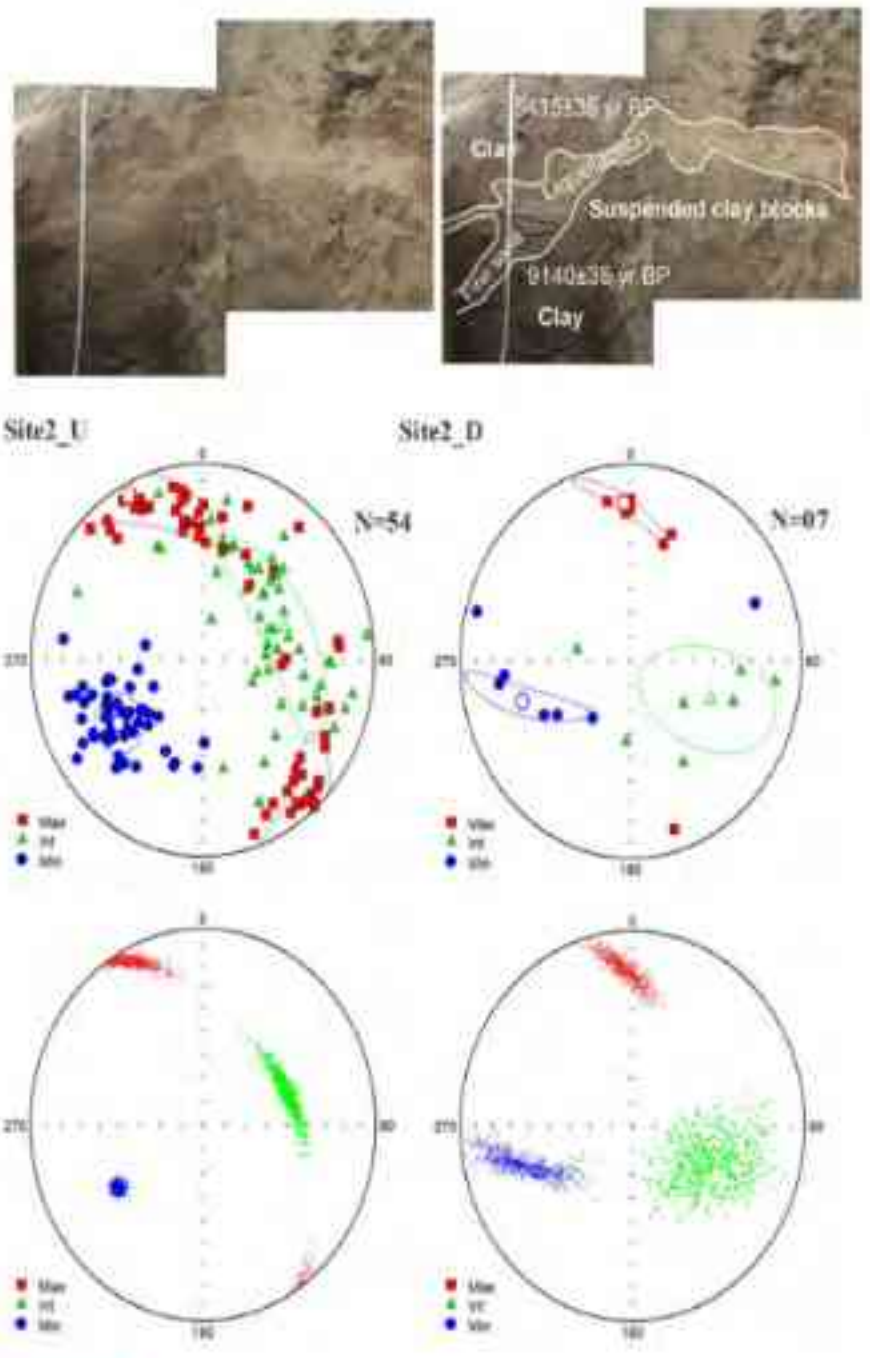

Figure 43 Anisotropy of magnetic susceptibility results for undeformed and deformed sediments from site 2. Top panel: Photograph showing earthquake induced deformation features at site 2 (Lakshmi and Gawali, 2022) Middle panel: The distribution of the Kmax, Kint and Kmin parameters plotted on equal-area lower hemisphere projections and their 95% confidence angles.Bottom panel: equal-area lower hemisphere projections of bootstrapped AMS principal axes.

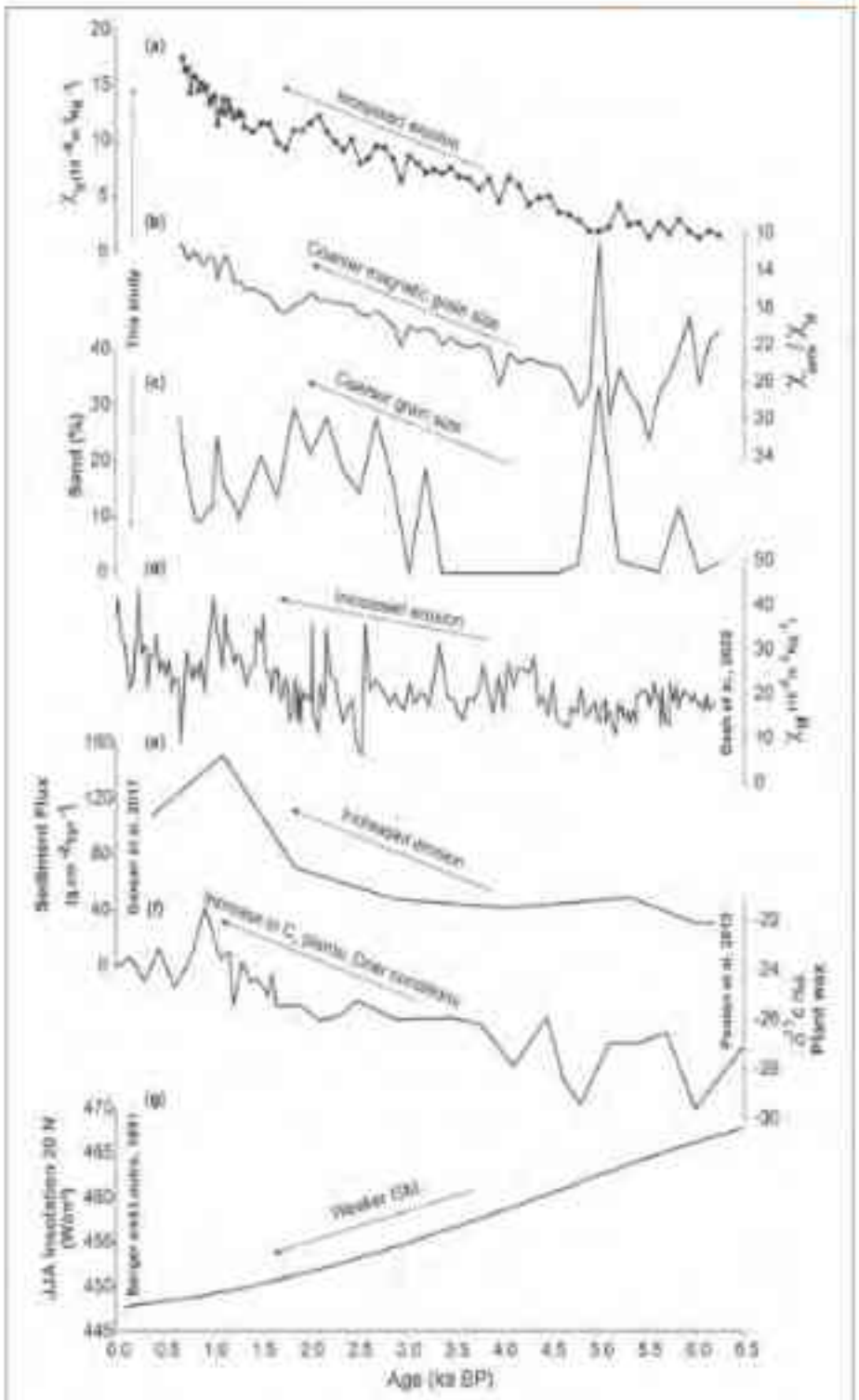

Figure 44 Comparison of SK355/GC01 record with the nearby studies showing the mid to late Holocene aridification of the central India. (a) magnetic susceptibility (χlf), (b) magnetic grain size χarm/χlf and (c) sand content of SK355/GC01; (d) χlf record from Chilika Lagoon, east coast of India (Dash et al., 2022); (e) sediment flux data (Giosan et al., 2017); and (f) δ13C plant wax record close to Godavari River mouth (Ponton et al., 2012) and (g) JJA insolation at 20-N (Berger and Loutre, 1991)

Mid to Late Holocene Indian Monsoon Variability, Aridification and Civilization Changes in the Deccan Plateau, India

A high-resolution sedimentary record from the western Bay of Bengal offers insights to centennial-scale mid- to late-Holocene Indian summer monsoon (ISM) variability and its role in the decline of chalcolithic human settlements on India's Deccan Plateau. Increased erosion in the Indian peninsula during the mid to late Holocene, due to aridification and agricultural expansion, is evidenced by higher sedimentation, more magnetic mineral content, coarser magnetic grain size, and increased sand content (Figure 44). The results from mineral magnetic and textural analyses reveal centennial-scale abrupt weak ISM during the Bond events in the core monsoon zone of India.

Environmental magnetic, rock magnetic and anisotropy of magnetic susceptibility properties of sediments from the 7.2 m core from Surha Lake were analysed. To reveal their magnetic properties, 150 loose sediment samples collected from a 7.2 m sediment section were exposed to different magnetic experiments. The concentration-dependent mineral magnetic parameters, magnetic susceptibility (χ), anhysteretic remanent magnetisation (ARM) and saturation isothermal remanent magnetization (SIRM) show variations

and similar trends throughout the section. The values are relatively high and fluctuate from 0 to 235 cm depth compared to the bottom (>235 cm), and in the bottom of the section, values are significantly low after depths >235 cm. The high S-ratio values (0.8 to 0.9) of the sediment samples suggest that magnetically "soft" magnetic minerals (magnetite and maghemite) dominate the magnetic mineralogy. A significant decrease in S-ratio values is documented at 175 cm (0.53), from 240 cm to 320 cm (0.55 to 0.73), and 340 cm to 360 cm (0.27 to 0.33), suggesting the presence of hematite, a hard magnetic mineral. The Hard IRM supports this conclusion at these depths.The behavior of magnetic susceptibility as a function of temperature is a routine method for identifying magnetic minerals. Temperature-dependent magnetic susceptibility (χ-T) measurements can provide information about mineralogy and transformation of magnetic minerals by recognizing the Curie temperature (Tc) and other special features. χ-T curves from Surha sediment core for representative samples are shown in Figure 45. All heating curves (red) are characterized by a sharp drop at about 585°C, which is the Tc of magnetite. However, the cooling curves lie above the heating curves due to formation of new magnetite from other minerals (Fe-bearing silicates and clay minerals) during heating (Figure 45).

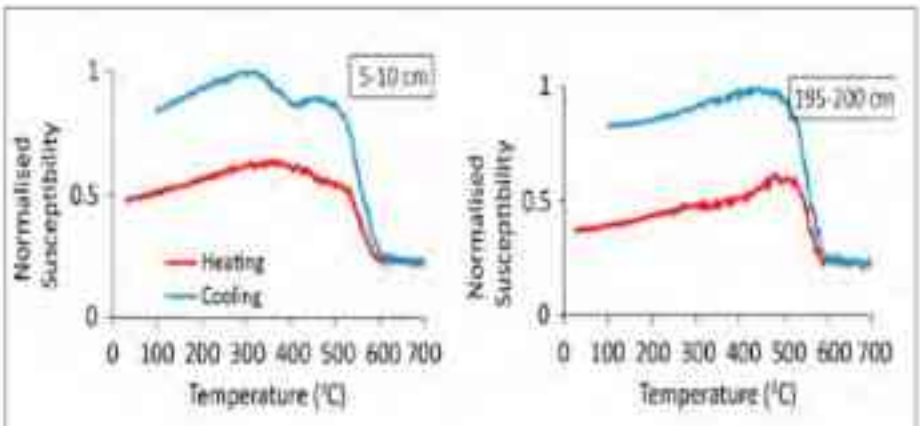

Figure 45 Temperature-dependent magnetic susceptibility (χ-T) curves for the representative samples from Surha Lake core.

Paleomagnetic studies in Leh-Ladhak region

Field investigations were carried out in the Leh-Ladakh Himalaya to study the high-resolution geomagnetic field variations from lacustrine and rock archives. Oriented sediment samples were collected from Khalsi, Saspol, Gupuk, and Phyang paleolacustrine deposits and rock samples from dykes and the Upshi-Lato section. Oriented and loose sediment samples were also collected from a 1.4 m pit in the Tsokar Lake. The subsampling process of the Khalsi sediment section is completed for Paleomagnetic and Environmental magnetic measurements. Paleomagnetic and rock magnetic data acquisition is in progress.

Paleomagnetic study of the Capo Di Bove lava flow

The Capo di Bove (CDB) lava flow was emplaced at ~277 ka during the Faete eruptive Phase of Colli Albani volcanic district near the city of Rome. The CDB lava has a historical significance as it provided the slabs used in the paving of the ancient Appian Way, built in the 4th century BCE. Puzzlingly beyond the seventh milestone, the ancient Appian Way deviates briefly from an otherwise straight SE-NW direction, abandoning the top of the lava flow and resuming its elevation and the SE-NW trend within less than 1 km. This peculiarity raised a question as to whether the deviation could have been the result of a tectonic deformation caused by a (buried) fault. To test this hypothesis, the CDB lava flow was sampled at four locations over a ~ 10 km transect near the ancient Appian Way around the bend and performed a detailed rock magnetic, paleomagnetic, and petrographic study. Rock magnetic data indicate that pseudo-single-domain magnetite and low-Ti titanomagnetite particles are the main magnetic carriers for three sampling locations, located in freshly cut quarries, which reliably recorded the paleomagnetic field at the time of emplacement. Conversely, the samples collected in the upper part of the lava flow, within the bent segment of the ancient Appian Way, show multi-domain low- and moderate-Ti titanomagnetites as main magnetic carriers which fail to record a paleomagnetic direction. AMS data are consistent with an overall CDB lava flow direction from SE to NW and the paleomagnetic directional data from the three reliable sampling sites are statistically indistinguishable (Figure 46). Hence, data from this study

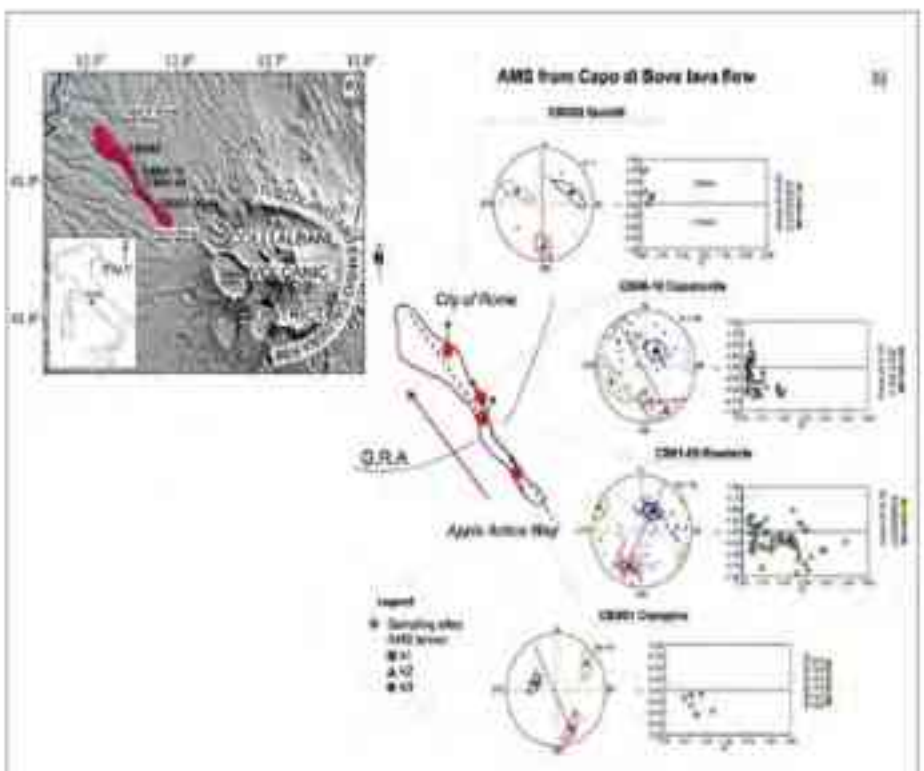

Figure 46 a) Study area showing sampling location in the Capo Di Bove (CDB) lava flow; b) Anisotropy of magnetic susceptibility results on the CDB lava flow.

show no evidence of post-emplacement tectonic rotations. It is suggested that the origin of the bend could be identified in the pre-existing morphology (for the lava flow path) and in historical reasons (for the ancient Appian Way).

Eocene alkaline volcanism from the western Rio Grande Rise

The origin and evolution of the Rio Grande Rise is deeply related to the opening of the South Atlantic Ocean. The geology of the plateau records the transition from divergent plate margins at the Mid-Atlantic Ridge to an intraplate tectonic setting. Despite the potential to bring insights into the complex tectono-magmatic processes involved in the development of the Rio Grande Rise, there is an overall lack of integrated petrological studies regarding its intraplate Eocene alkaline magmatism. Trachytes, trachyandesites, alkali basalts, a trachybasalt and a basanite dredged from the western Rio Grande Rise were investigated to characterize its magmatic system. Integrated petrography, mineral chemistry and whole-rock geochemistry suggests that these rocks have evolved in a complex transcrustal polybaric magmatic system, where crystals were remobilized by host liquids with different composition at distinct depths. Disequilibrium between crystals and host magmas is evidenced by abundant clinopyroxene macrocrysts with resorbed or corroded cores and rims with contrasting composition, as well as by resorbed feldspar macrocrysts. Clinopyroxene crystals also record cyclic compositional variations in magmatic chambers submitted to multiple magma recharge episodes and a strong control by fractional crystallization. U-Pb dating of zircons from a trachyte yielded an age of 46.9 ± 0.3 Ma, which reinforces the importance of the Eocene volcanism from the western Rio Grande Rise. Moreover, results from Pb, Sr and Nd isotope analysis reveal that Eocene alkaline volcanic rocks from the Western Rio Grande Rise have EMI-flavored Tristan-type signatures (Figure 47). This suggests that the mantle sources from the western Rio Grande Rise and from the Walvis Ridge and Guyot Province magmatism still shared common characteristics long after its separation from the Walvis Ridge.

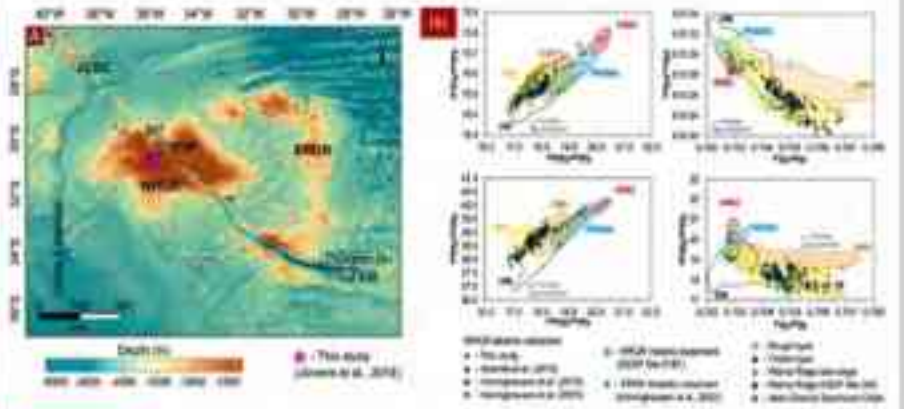

Figure 47 a) Sample dredging location of the volcanic rocks from the western Rio Grande Rise in South Atlantic; b) Pb, Sr and Nd isotope variation diagrams of Western Rio Grande rise samples along with previously published database from different locations. PREMA = Prevalent Mantle field; EMI and EMII = Enriched Mantle One and TWO Field; DM = Depleted Mantle; HIMU = High time-integrated μ = 238U/204Pb Mantle.

AMS on the Arabian Sea Sediments

A total of 265 samples from IODP expedition 355 site U1456 "Hole A" were analysed for magnetic susceptibility, revealing significant variation in magnetic mineral concentrations from the Pliocene to Pleistocene. AMS measurements indicated that most samples exhibit normal magnetic fabric distribution having oblate shape of the magnetic grains. However, 55 samples showed possible transient and inverse magnetic fabrics having mostly prolate shape (Figure 48). The nature of the transient and inverse magnetic fabrics is likely due to the presence of the single domain ferrimagnetic particles. Samples showing transient and inverse magnetic fabric distribution are being analysed for the unmixing of the anhysteretic remanent magnetization curves for distinguishing the nature of these single domain ferrimagnetic particles (i.e., detrital or biogenic).

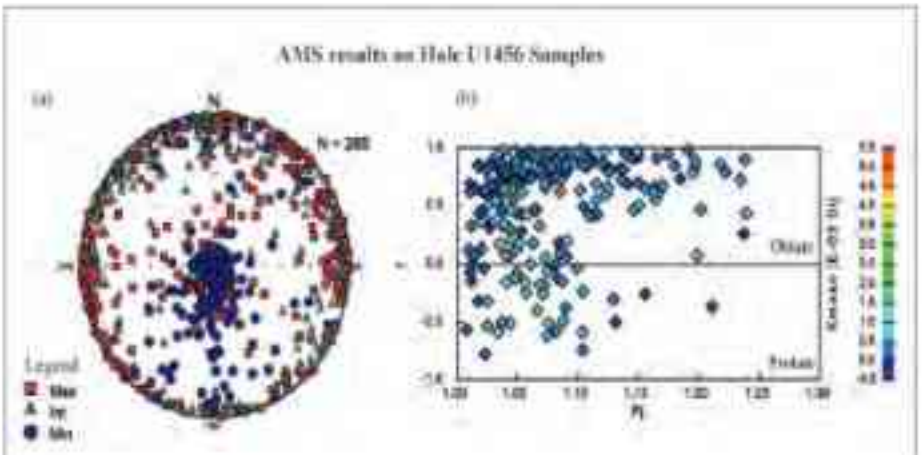

Figure 48 (a) AMS results on the IODP site 355, Hole U1456 core samples, and (b) the corresponding Jelinek plots (T = shape parameter, and Pj = corrected degree of anisotropy).

IONOSPHERIC SEISMOLOGY AND VOLCANOLOGY (SHIVA)

Chief Coordinator : Mala Bagiya

Members : Srinivas Nayak, Nava Kumar Hazarika, Research Associate and Research Scholars

Fair Weather Atmospheric Electric Field Variations from the Eastern Himalaya Syntaxis in North-East region of India

Fair weather atmospheric electric field (AEF) referred to as potential gradient (PG), recorded at Namsai (27.69°N, 95.85°E) in the Eastern Himalaya Syntaxis (Figure 49a) were analysed and examined with an aim to assess the general characteristics of PG over Namsai and further explore the possibility of deciphering seismic-associated signatures in PG. The work is based on data collected over 99 fair weather days spanning from November 2017 to April 2019.

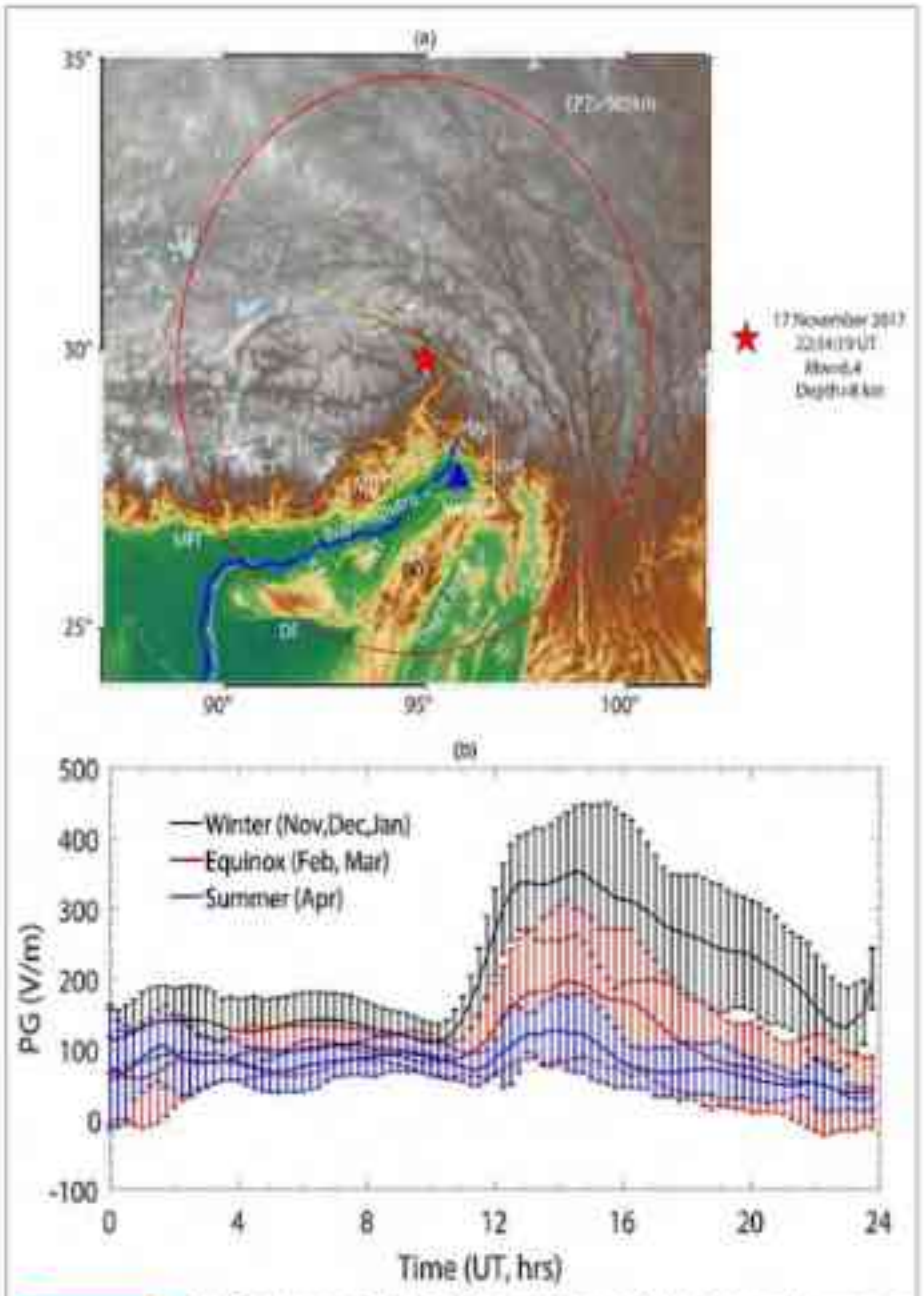

Figure 49 (a) Geographical location of Namsai station is shown in blue triangle. Significant fault systems of the region are shown in yellow (Geological Survey of India, 2000). Red star represents the earthquake epicentre and red circle represents the EPZ. White dashed line represents the EHS. Blue solid line represents the Brahmaputra River. MFT: Main Frontal Thrust, MCT: Main Central Thrust, MBT: Main Boundary Thrust, NT: Naga Thrust, DT:Dishang Thrust, MT: Mishmi Thurst,TP: Tibetan Plateau, SP: Shillong Plateau, JF: Jiali Fault, KF: Kopli fault, DF:Dauki fault, EPZ: Earthquake Preparation Zone, EHS: Eastern Himalayan Syntaxis.(b) Seasonal variations of fair weather PG over the Namsai.

Analysis indicated that the mean diurnal variation of fair weather PG peaks at ~14:00 UT. The PG values are highest during winter, followed by equinox and summer (Figure 49b). These characteristics of PG are explained in terms of variations in meteorological parameters, air pollution level, and geographical location of Namsai, i.e., the Brahmaputra river nearby and the deep forest surrounding it. An attempt has also been made to model the contribution of local factors by utilizing a multi-regression model, and the outcome suggests that the diurnal variation of PG at Namsai shows contributions from both global and local factors.

A sharp, bay-like negative variation in PG for around 2 hours was observed ~1 hour 40 minutes before the Mw 6.4 earthquake on November 17, 2017 (Figure 50). This earthquake occurred at a depth of 8 km, with its epicenter located in a blind fault near the Main Central Thrust, ~252 km from the observation station in Namsai (Figure 49a). This anomaly exceeded the lower limit of the mean AEF variation recorded during fair weather days. Importantly, it wasensured that there were no significant changes in meteorological parameters. The absence of such changes strengthens the hypothesis that the observed negative AEF variation is associated with seismic activity rather than meteorological influences. This study not only provides

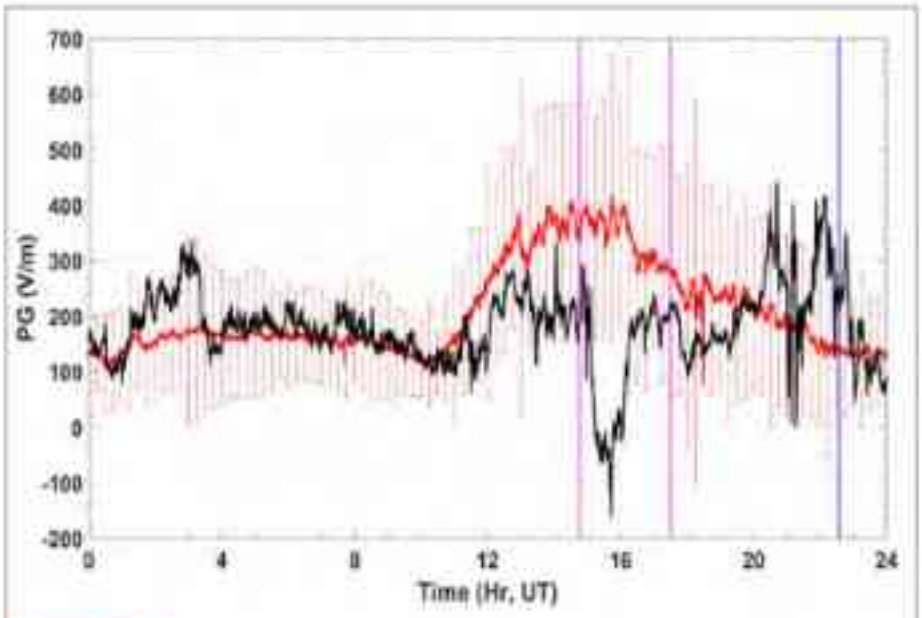

Figure 50 PG variation (in black) on earthquake day, 17 November 2017. A mean diurnal variation of PG over 12 fair weather days in November 2017, excluding the earthquake day is also presented (in red) along with 2σ error bar. The earthquake onset time is shown with blue vertical line. The anomalous PG variation during ~14:45UT to 17:45UT is highlighted with magenta lines.

better insights into the general variability of fair weather PG over this region but also highlights the importance of AEF measurements as a potential indicator of seismic events, sensing as precursory signals several hours ahead.

Co-seismic Ionospheric Perturbations Generated by Shallow Earthquakes in the Chile Subduction Zone

The Chile subduction zone is known to host megathrust earthquakes. Near-field co-seismic ionospheric perturbations (CIP) associated with recent large to great, shallow depth (22-25 km) earthquakes that occurred in the Chile subduction zone were investigated. These earthquakes are (i) 16 September 2015, Mw 8.3 (EQ1) (ii) 03 April 2014, Mw 7.7 (EQ2) (iii) 01 April 2014, Mw 8.2 (EQ3) (iv) 02 January 2011, Mw 7.1 (EQ4) and (v) 27 February 2010, Mw 8.8 (EQ5) (Figure 51a). Using total electron content (TEC) measured by the Global Navigation Satellite System (GNSS), it was observed that despite EQ3 having a lower magnitude than EQ1 and EQ5, the co-seismic ionospheric perturbation (CIP) during EQ3 exhibited higher amplitudes than those associated with EQ1 and EQ5 (Figure 51b,c). The amplitude of CIP also depends on non-seismic parameters in addition to the concerning earthquake magnitude. The comparison of relative CIP amplitudes, in light of the non-seismic parameters of the geomagnetic field and satellite geometry, suggests that background electron density (due to different local times of earthquake occurrence) played a major role in contributing to CIP amplitudes. It is believed that this thorough analysis leads to a better understanding of non-seismic factors that can largely influence the CIP amplitudes apart from the earthquake magnitudes.

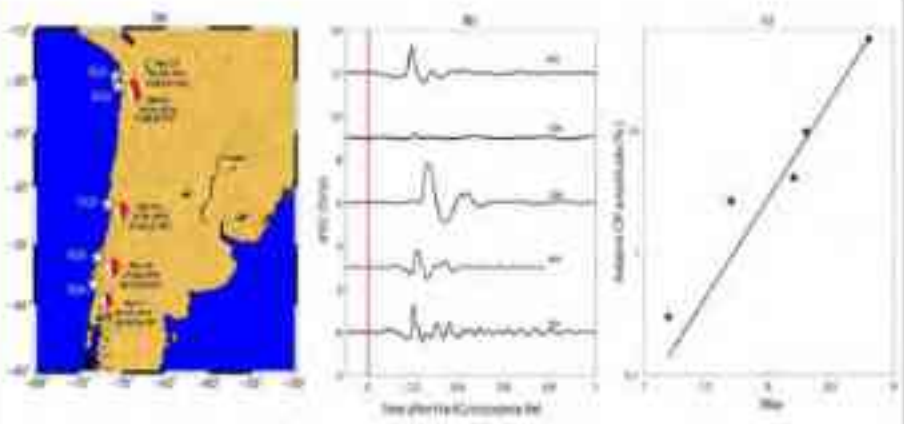

Figure 51 (a) Geographical map showing the epicentre locations of Chile subduction zone earthquakes considered in the study. (EQ1) 16 September 2015, Mw 8.3, (EQ2) 03 April 2014, Mw 7.7, (EQ3) 01 April 2014, Mw 8.2, (EQ4), 02 January 2011, Mw 7.1, and (EQ5) 27 February 2010, Mw 8.8. All events occurred with the thrust focal mechanism. (b) CIP time series during EQ1 EQ2, EQ3, EQ4, and EQ5 within a time frame of -0.05–1 hr where the red line is drawn at 0 UT representing the onset time of the respective earthquake event. (c) Relative CIP amplitude as a function of magnitude. Black line is the best fit line. The y-axis is in logarithmic scale.

Strong Southwest Rayleigh Wave Radiation from Ionospheric Observations of the Elbistan Earthquake of the 2023 Kahramanmaras, Türkiye, Doublet

Vertical surface movements associated with the passage of Rayleigh surface waves of large earthquakes excite acoustic waves in the atmosphere. They propagate upward and disturb electron density structures in the ionosphere, which can be observed by comparing phase differences of two microwave signals from satellites. Such ionospheric signatures of a large earthquake in Turkey in 2023 February have been studied. The 2023 Elbistan (Mw 7.6) earthquake, the second event of the Kahramanmaraş, Turkiye doublet, occurred by bilateral sub- and supershear fault ruptures toward northeast and southwest, respectively. Utilizing the data from a dense network of GNSS receivers in Turkiye, the study investigated Rayleigh surface wave signatures in the ionosphere. Significantly larger signals were observed to the southwest of the epicenter that cannot be explained by the satellite line-of-sight geometry. This strong beam toward southwest, possibly caused by the supershear rupture, was also supported by observations with seismometers and GNSS kinematic solutions (Figure 52). The finding demonstrates that Rayleigh wave signatures in ionosphere contain rich information on earthquake source processes.

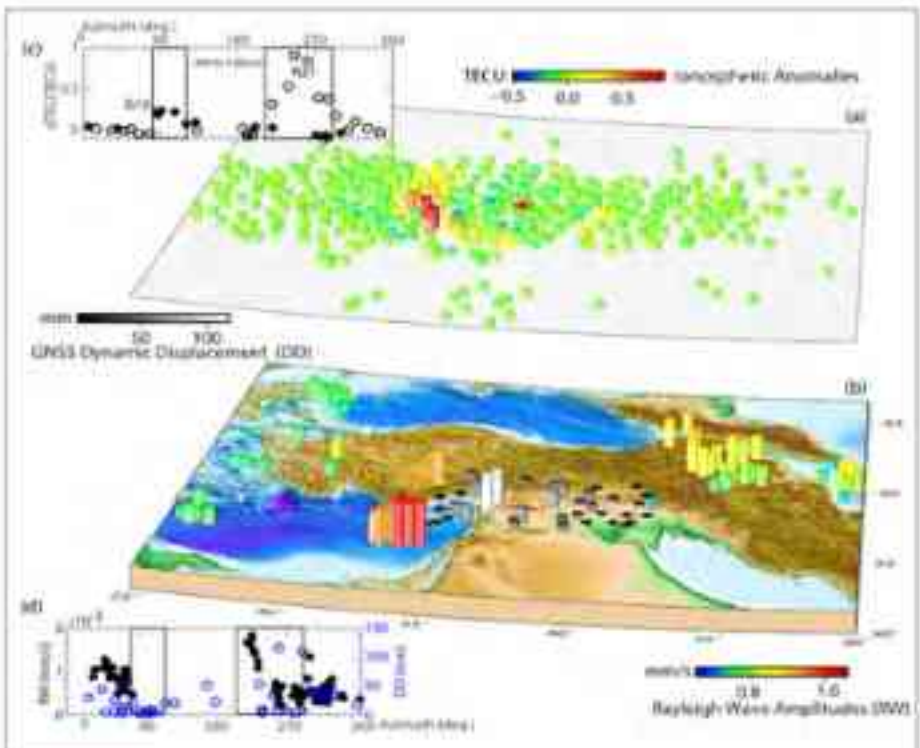

Figure 52 Conceptual 3-D schematic diagram showing the (a) spatial distribution of TEC anomalies caused by the Rayleigh wave passage observed with various GNSS satellites at 10:37:00 UT on 06 February 2023, and (b) amplitudes of Rayleigh waves (25–90s band) as recorded in seismometers (colored columns) and of dynamic displacements of GNSS stations (black and white columns). The strong beam in the ionosphere is corroborated with the two kinds of ground observations. Azimuth variation of the strengths of the first positive wave front in TEC anomalies, captured by GNSS satellites R21 and G15, and Rayleigh wave amplitudes by seismometers and GNSS dynamic displacements are given in (c, d), respectively.

FIELD SURVEYS

1. A 20-day field survey was conducted in Prayagraj and nearby areas during June-July 2024, and a total of 610 road dust samples were collected at intervals of 1.5 to 2.5 km to monitor the distribution of airborne particulates associated with anthropogenic activities.

2. A field survey was conducted for collection of dust samples from top soil and permanent structures during Maha Kumbh 2025 in Prayagraj, so as to track the dispersion of airborne particles related to anthropogenic activities during January 25-February 5, 2025.

3. A ground magnetic survey was conducted over parts of Assam and Meghalaya, in the Brahmaputra Valley, to understand the sub-surface characteristics of the region. The survey was carried out from October 7-24, 2024.

4. With an aim to delineate structures below the Deccan traps, a ground magnetic survey was undertaken along the coastal Deccan Volcanic Province of Maharashtra covering Sindudurg and Ratnagiri districts. The survey spanned for 20 days from January 16 to February 4, 2025.

5. Field work was carried out for collection of Lake Bottom sediment core sample at Bakhira Lake, Uttar Pradesh, during April 15-21, 2024.

6. A field work was carried out for the collection of sediment samples in the paleolake deposits and rock samples from Leh-Ladakh, Himalaya, during September 15-October 4, 2024.

7. The collection of bed-load and surface sediments from lakes and their catchment in the Surha Taal in Ballia and Bakhira Taal in Sant Kabir Nagar, Uttar Pradesh, Ganga plain region were carried out during February 19-28, 2025.

8. A comprehensive paleomagnetic and petrological fieldwork for collecting oriented block rock samples from sills and flows of the Rajmahal Trap (RT) across Bihar, Jharkhand, and West Bengal, September 17-October 2, 2024.

9. Airglow observation surveys were conducted at the Vainu Bappu Observatory, Indian Institute of Astrophysics (IIA), Kavalur, Tamil Nadu, during the periods February 23 to March 2, 2025, and March 26 to March 31, 2025. The objective of the surveys was to gather airglow data using the Table-Top Fabry-Perot Interferometer.

PUBLICATIONS

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3. Ajith, K.K., A.K. Patra, G. Li, **S. Sripathi,** P. Pavanchaitanya, M. Yamamoto and S. Perwitasari, Identifying the onset location of Equatorial Plasma Bubbles (EPBs) and its relationship with the background Ionospheric conditions, *J. Geophys. Res. (Space Physics)*, **129(4)**, e2023JA032369, 2024, https://doi.org/10.1029/2023JA032369.

4. **Amrutha, S.V. Singh**, K.C. Barik and G.S. Lakhina, Magnetosonic waves driven by Maxwellian ring protons in the Martian upper Ionosphere, *Geophys. Res. Lett.*, **52(5)**, e2024GL112947, 2025, https://doi.org/10.1029/2024GL112947.

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84. Yadav, V.K., Y. Vijaya, B.K. Prasad, P.T. Srikar, M. Mahajan, K.V.L.N. Mallikarjun, S.N. Zamani, K.A. Lohar, M.M. Kandpal, S. Narendra, V.S. Rai, A.A. Adoni, D.R. Veeresha, T.S. Smaran, A. Kalpana, N. Srivastava and **G. Vichare**, The Fluxgate Magnetometer (MAG) on board Aditya-L1 spacecraft, *Solar Physics*, **300(3)**, 33, 2025, https://doi.org/10.1007/s11207-025-02440-0.

85. Zeng, X., L. Alves, M.A. Boucher, A. Cherchi, C. DeMott, **A.P. Dimri** et al., Global precipitation experiment – a new world climate research programme lighthouse activity, *Bull. Am. Meteorol. Soc.*, **106(2)**, E408-E418, 2025, https://doi.org/10.1175/BAMS-D-23-0242.1.

CHAPTERS IN BOOKS/ BOOKS EDITED/ PROCEEDINGS/ NON SCI JOURNALS

1. Chandan, K. and **A.P. Dimri,** Monitoring the ionosphere using remote sensing techniques, Remote Sensing for Geophysicists, ed. Mukesh Gupta, CRC Press, 2025, 95-112, 978-1-032-77892-1

2. Upadhyay, A. and **A.P. Dimri,** Understanding geomagnetic environment from satellite and ground-based magnetometers Remote Sensing for Geophysicists, ed. Mukesh Gupta, CRC Press, 2025, 65-78, 978-1-032-77892-1

3. Sherin, Ann A., S. Antony, and **C.P. Anil Kumar**, Joule heating: Halloween storm on 29-31, October 2003, Physics of Auroral Phenomena, Polar Geophysical Institute, Proc.XLVII, 458-461, Russian Academy of Sciences, 2024.

IMPACT FACTOR OF PUBLICATIONS DURING 2024-2025

Sr. No	Journal Name	No. of Papers	Impact Factor	Cummulative IF
1	Adv. Space Res.	08	2.8	22.4
2	Aerosol Sci. Eng.	01	2.0	2.0
3	Ann. Geophys.	01	1.9	1.9
4	Atmos. Res.	01	4.4	4.4
5	Bull. Am. Meteorol. Soc.	01	5.9	5.9
6	Clim. Dynam.	02	3.7	7.4
7	Curr. Sci.	02	1.1	2.2
8	Data Science J.	01	--	--
9	Discov. Water	01	--	--
10	Earth Planets Space	01	2.5	2.5
11	Earth Space Sci.	02	2.6	5.2
12	Eng. Res. Express	01	1.6	1.6
13	Enviro. Earth Sci.	01	2.8	2.8
14	Front. Astron. Space Sci. (Sec. Space Physics)	01	2.6	2.6
15	Front. Earth Science (Sec. Peterology)	01	2.0	2.0
16	Geophys. J. Int.	01	2.7	2.7
17	Geophys. Res. Lett.	04	4.6	18.4
18	Geothermics	02	3.9	7.8
19	GPS Solut.	01	3.9	3.9
20	J. Asian Earth Sci.	01	2.4	2.4
21	J. Atmos. Sol. Terr. Phys.	04	1.9	7.6
22	J. Cosmol. Astropart. Phys.	01	5.9	5.9
23	J. Earth Syst. Sci.	05	1.7	8.5
24	J. Geophys. Res. (Space Physics)	14	2.9	40.6
25	J. Geological Society of India	01	1.5	1.5
26	J. Ind. Geophys. Union	02	0.2	0.4
27	J. Paleogeogr.	01	2.0	2.0
28	J. Volcanol. Geotherm. Res.	01	2.3	2.3
29	Mar. Geol.	01	2.2	2.2
30	Mar. Pet. Geol.	02	3.6	7.2
31	Mon. Not. R. Astron. Soc.	01	4.8	4.8
32	Mon. Not. R. Astron. Soc. Lett.	01	4.38	4.38
33	Oceanologia	01	2.3	2.3
34	Phy. Plasmas	01	2.2	2.2
35	Plasma	01	1.7	1.7
36	Radio Science	01	1.5	1.5
37	Radiocarbon	01	1.3	1.3
38	Solar Physics	01	2.4	2.4
39	Space Weather	04	3.5	14.0
40	The Astrophys. J.	03	5.4	16.2
41	The Holocene	01	1.8	1.8
42	Theor. Appl. Climatol.	01	2.7	2.7
43	Tropical Cyclone Research and Review	01	2.4	2.4
44	Turkish J. Earth Sci.	01	1.1	1.1
	TOTAL	**85**		**235.08**

INVITED TALKS AND LECTURES

Prof. S. Gurubaran

Invited talk on "Global Trend in the Exploration of the Near-Earth Space: Open Scientific Questions and Way Ahead" at the '*Brainstorming Meeting on Space Science Roadmap Formulation*', ISRO-URSC, 22 April 2024.

Invited talk on "Beyond the Horizon: Harnessing Space Technology to Combat Climate Change" at Amity University, Mumbai, 11 October 2024.

Invited lecture on "Geophysical Significance of Kolhapur in Atmosphere-Ionosphere Research" at the '*AIDON Workshop*', Shivaji University, Kolhapur, 3 January 2025.

Invited talk on "Geomagnetism: The Earth's Protective Shield in Outer Space" at IIT Bombay, on 21 March 2025.

Prof. Geeta Vichare

Invited talk on "Information System in Space Science" at the '*GIS and health geographics Workshop*', NIPHTR, Panvel campus, 18 July 2024.

Prof. Amar Kakad

Invited talk on "Magnetospheric Spacecraft Mission" at '*Brain Storm Meeting on ISRO's roadmap for 2047*' April 10, 2024 (Online).

Invited Planetary talk on "Space plasma research at Indian Institute of Geomagnetism" at '*Conference on Plasma Simulation*' at IIG Navi Mumbai, 11-13 November 2024.

Invited talk on "Coherent Electric Field Structures in the Earth's and Martian Plasma Environments" at the '*45th Scientific Assembly Bexco*', Busan, Korea, 13-21 July 2024.

Prof. S. Sripathi

Invited lecture on "Advanced Digital Ionosondes" at the '*Workshop on Ionospheric Measurement Techniques and Instrumentation duringURSI-RCRS 2024*', Bhimtal, held on 11-25 October 2024.

Prof. Anand S.P.

Invited talk on "Utility of Geo-potential methods in Hydrocarbon Exploration" at ONGC, SPG Mumbai Chapter, 17 April 2024.

Prof. S. Tulasiram

Invited lecture on "Ionospheric Modelling and Radio Wave Propagation" at the '*Workshop on Ionospheric Measurement Techniques and Instrumentation during URSI-RCRS 2024*', Bhimtal, on 11 October 2024.

Invited lecture on "Effects of Space Weather at Equatorial Ionosphere" at the '*Centre for Space Science and Technology Education in Asia and the Pacific (CSSTEAP)*, Affiliated to the United Nations, Space Application Center, Ahmedabad, 24 February 2025.

Prof. Bharati Kakad

Invited talk on "Charged Particle Dynamics in Earth's Ionosphere-Magnetosphere System" at '*IIG-SUK AIDON workshop*', Shivaji University, Kolhapur, 3 January 2025.

Sh. Rupesh N. Ghodpage

Invited lecture on "Study of Upper Atmosphere Using Optical and Radio Techniques" at the Department of Physics, Shivaji University, Kolhapur, 23 August 2024.

Prof. Navin Parihar

Invited lecture on "Impact of Lightning on The Upper Atmospheric Processes" at the '*Conference on Atmospheric Lightning Monitoring, Forecasting and Mitigation*' NRSC (ISRO), Hyderabad 28 November 2024.

Invited lecture on "Airglow: A Passive Remote Sensing Tool to Study Planetary Atmospheres" at the 'AIDON Workshop 2025' Shivaji University, Kolhapur on 3 January 2025.

Dr. S. Sathishkumar

Invited lecture on "The Medium Frequency (MF) Radar and Its Application to the Middle and Upper Atmosphere" at the Workshop on '*Atmosphere–Ionosphere Dynamics: Observations and Data Analysis (AIDON)*', Shivaji University, Kolhapur, 3 January 2025.

Dr. K. Deenadayalan

Invited lecture on "Archaeomagnetic study of historical artefacts: Unveiling geomagnetic field variations in India" at '*IMPRESS-2025*', IIG Navi Mumbai on 28 February 2025.

Mr. Prasanna Mahavarkar

Invited lecture on "Optical Technique to Measure Airglow Emission of theThermosphere" at Dhempe College of Arts and Science, Miramar, Panjim, Goa, 15 March 2025.

Dr. Remya B

Invited lecture on "EMIC waves in the Earth's magnetosphere: Understanding the drivers" at '*URSI RCRS 2024*', Bhimtal, Uttarakhand, India, 22-25 October 2024.

Invited lecture on "Magnetospheric particle dynamics during severe geomagnetic storm" at the '*Conference on Plasma Simulations (CPS)*', Mumbai, India, 11-13 November 2024.

Dr. Devanandhan S

Invited talk on "Pathway to a scientific career" at Velammal metric higher secondary school, Ponneri, 8 August 2024. **(Online)**

Dr. Priyeshu Srivastava

Invited talk on "*Understanding the Impacts of Humans on Earth's Ecosystem*" on the *'Earth Day-2024'*, at Indian Institute of Geomagnetism, Navi Mumbai, 22 April 2024.

Archana Bhattacharyya

Invited talk on"Exploring the links between Earth's Magnetic Field and Near-Earth Space Weather", during SOAFAL Series Oration organized by Women in Science (WiS) and tAcT (The Academy Trust) of the Indian Academy of Sciences and official partners, Siksha 'O' Anusandhan University, Bhubaneswar, October 19, 2024.

Invited talk on"Evolution of equatorial plasma bubbles as seen through ionospheric scintillation observations", Dr. A. K. Sundaram Memorial Lecture for 2024, organized by the Plasma Science Society of India, at the Institute for Plasma Research, Gandhinagar, December 10, 2024.

PARTICIPATION IN CONFERENCES/MEETINGS/SEMINARS

NATIONAL

URSI Regional Conference on 'Radio Science', ARIES/ GEHU, Bhimtal, Uttarakhand, October 22–26, 2024

Ankita, M. and S. Tulasiram

A Software for True Height Analysis of Ionograms using Iterative Gradient Correction (IGC) Method.

Ankita, M. and S. Tulasiram

Simulating the Ionogram Signatures of Bottom-side Upwelling Structures in the Equatorial Ionosphere.

Guru, K. Siba Kiran and S. Sripathi

Evaluating Vertical Electron Density over Tirunelveli Using Ionosonde Measurements under Quiet and Disturbed Space Weather Conditions.

Patil, Omkar M., Rajesh Singh and A. P. Dimri

Mesoscale Convective Systems: Investigating Lightning Discharge Patterns and Atmospheric Gravity Waves above Tropical Cyclones over the Indian Region.

Sripathi, S., B. Gayathri, K. Siba Kiran Guru and Rajesh Kumar Barad

Characteristics of Occurrence Probability of Equatorial Plasma Bubbles (EPBs) over an Equatorial Station.

Sripathi, S., S. Tulasiram, Ajay Khandare, Poornima Shrivastava, Anil Kulkarni and Prafull Irpache

Deployment of Advanced Digital Ionosonde System (ADIS) for Ionospheric and Space Weather Studies at KSKGRL, Prayagraj: Initial Results.

Shubhangi Lagad, Amar Kakad and Bharati Kakad

Generation of High-Frequency Plasma Waves and Their Role at Earth's Magnetopause.

Ayushi Srivastava, Bharati Kakad and Amar Kakad

Probing Jupiter's Radiation Belt: Insights from Test Particle Simulations of Charged Particle Dynamics.

Sahil Pandey, Amar Kakad and Bharati Kakad

Double Layers in the Martian Magnetosphere.

Amrutha, Satyavir Singh, K. C. Barik and G. S. Lakhina

Magnetosonic Waves Driven by Maxwellian Ring Beam Protons in the Martian Ionosphere.

Jayashree Bulusu, Adhithya Pavithran, T. Sreeraj and Remya B

Investigation of Pc1 pulsations in response to dipolarization front in the magnetosphere.

Remya, B., A.J. Halford, S. J. Noh, P. A. Fernandes, B. Grison, D. Wang, J. Himmelsbach, T. Esman, D. B. Graham, D.G. Sibeck, T. Raita and **A. P. Dimri**

EMIC waves in the Earth's magnetosphere: Understanding the drivers (**Invited Lecture**).

S. Tulasi Ram et al.

Empirical model of Equatorial ElectroJet (EEJ) using long-term observations from the Indian sector.

B. Nilam and S. Tulasi Ram

The prediction of rapid response of Equatorial electrojet (EEJ) to Interplanetary (IP) shocks.

Parihar, N., A.K. Singh, **Saranya P. and** S. Saini

On the response of the mesopause region over an Indian Antarctic station Bharati to the geomagnetic storm of 23-24 March 2023.

National Conference on 'Plasma Simulation', IIG HQ, Navi Mumbai, November 11-13, 2024

Tulasiram, S.

Origin, Growth and Dynamics of EPBs through Observations and Simulations.

Amar Kakad

Planetary space plasma research (Plenary Talk).

Ayushi Srivastava, Bharati Kakad and Amar Kakad

Ring current modelling for extreme Space Weather Conditions.

Ayushi Srivastava, Bharati Kakad and Amar Kakad

Understanding adiabatic and non-adiabatic processes of highly energetic charged particles in Jupiter's radiation belts.

Sahil Pandey, Amar Kakad and Bharati Kakad

Fluid Simulation of Coherent Electric Field Pulses in the Martian Magnetosheath.

Remya, B.

Magnetospheric particle dynamics during severe geomagnetic storm (Invited talk).

61st Annual Convention of theIndian Geophysical Union, (IGU) conducted by Banaras Hindu University, Varanasi, Uttar Pradesh, December 3-5, 2024

Pradnya Mohite, K. Deenadayalan, B.V. Lakshmi and Manish Rai

Investigating Archaeomagnetic Insights from Harappan civilization at Lothal, Gujrat.

Manan Singh, Pradnya Mohite, B.V. Lakshmi, K. Deenadayalan and Abhijit Ambedkar

Early historic to medieval period environmental magnetic record of sediments from Vadnagar archaeological site, Western India.

Babul Sahoo, Sujit K. Pradhan, Ramesh K. Nishad, Anup K. Sinha, E. Karthikeyan and Gautam Gupta

A preliminary rock magnetism, paleomagnetism, AMS, and paleo-intensity studies of Malwa Plateau, Northern Deccan Traps, India.

Anand, S.P., M. Rawat and A.P. Dimri

Depth to bottom of magnetic sources and heat flux over Indian sub-continent from satellite magnetic data.

Subrata Kundu, Mala S. Bagiya, S. Gurubaran, Srinivas Nayak, N.K. Hazarika and A.P. Dimri,

Variability of Fair-Weather Atmospheric Electric Fields in the Eastern Himalayan Syntaxis

Satyamesh H. Tiwari, Mala S. Bagiya, Subrata Kundu, S. Gurubaran and A. P. Dimri

Atmospheric Gravity Waves generated by Large Volcanic Eruptions: Emphasis on Generation Mechanism

3rd Indian space weather conference (ISWC) held from 7-9 October 2024, at IIT Roorkee, Uttarakhand, India

Pranali Thakur and Geeta Vichare

Secondary Cosmic Ray Variations during Extreme Space Weather Event on May 10-11, 2024

Atmosphere-Ionosphere Dynamics: Observations and Data Analysis (AIDON 2025) IIG-SUK, Shivaji University, Kolhapur, January 3, 2025

Bharati Kakad

Charged Particle Dynamics in Earth's Ionosphere-Magnetosphere System (Invited Talk).

7th Conference on RADAR Meteorology (IRAD 2025), IIG-IMD, Navi Mumbai, January 5–8, 2025

Patil, Omkar M., Rajesh Singh and A. P. Dimri

Extremely Severe Cyclonic Storm: Intensification and Electrification over Indian Region.

Patil, P. T., R. N. Ghodpage, S. Sripathi and A. P. Dimri

Impact of Solar Flares on Mesospheric Dynamics: A Study Using Medium Frequency Radar Measurements in May 2024.

International Workshop on Stratosphere-Troposphere Interactions and Prediction of Monsoon weather Extremes (STIPMEX), June 02-07, 2024, IITM Pune

Vasundhara Barde, Jayashree Bulusu and A.P. Dimri

Role of Solar Forcing in Alteration of Indian Summer Monsoon Through Tropospheric- Stratospheric Circulations.

International Conference on Sustainable Agricultural Development with Climate Smart Systems (SADCSS) during May 23-25, 2024 at Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, Odisha

Vasundhara Barde, **A. P. Dimri,** U.C. Mohanty **and** R. K. Panda

Understanding the summer monsoon rainfall and temperature patterns in homogeneous regions of India.

International Conference on Advancement and Emerging Trends in Sciences (ICAETS-2025), Dahiwadi College, Dahiwadi, January 8–10, 2025

Mane, A. P., S. S. Mahajan, O. B. Gurav, **R. N. Ghodpage,** G. A. Chavan **and** P. P. Chikode

Impact of Multi-Branching Equatorial Plasma Bubbles on GPS TEC and VHF Scintillation from Low Latitude Station, Kolhapur.

Sun, Space-weather, and Solar-Stellar connection, Indian Institute of Astrophysics, Bengaluru, January 20-24, 2025

Nivedita Chakraborty, Selvaraj Devanandhan, Satyavir Singh and Gurbax Lakhina

Studying electrostatic solitary wave phenomena due to solar wind-magnetosphere interaction at Mars's reconnection region.

Conference on Frontiers in Geosciences Research, PRL, Ahmedabad, 5-7 February, 2025

Sunil Saini, Mala S. Bagiya, Satish Maurya and A.P. Dimri

Assessment of Ionospheric Perturbations Generated by the Mw 9.1 Tohoku-Oki Earthquake.

Space for Sustainability: Science, Technology, Education and Policy (S2:STEP2025) and Indian Planetary Science Conference (IPSC), IIT Roorkee, Uttarakhand, India, March 4-7, 2025

Ayushi Srivastava, Bharati Kakad and Amar Kakad

Understanding the Role of Charged Dynamics in Jupiter's Radio Emissions.

Sahil Pandey, Amar Kakad and Bharati Kakad

Plasma waves in the Martian magnetosheath jet.

INTERNATIONAL

European Geosciences Union General Assembly, Vienna, Austria, April 14-19, 2024 (Virtual)

Mujahed Baba, B.V. Lakshmi, V.M. Rokade, K. Deenadayalan, S.N. Patil and Priyeshu Srivastava

Examining Seismites using Anisotropy of magnetic susceptibility in and around the Kopili Fault Zone, Northeast India: A Characterization Study.

International School/Symposium for Space Simulations (ISSS-15) & Workshop on the Interrelationship between Plasma Experiments in the Laboratory and in Space (IPELS-16), Garching, Munich, Germany, Aug 1-9, 2024

Ayushi Srivastava, Bharati Kakad and Amar Kakad

Charged particle dynamics in the Jupiter's Radiation Belts: A test particle simulation.

Sahil Pandey, Amar Kakad and Bharati Kakad

Simulation Study of Solitary Waves in the Martian Magnetosphere.

45th Scientific Assembly Bexco, Busan, Korea, July 13-21, 2024

Amar Kakad

Coherent Electric Field Structures in the Earth's and Martian Plasma Environments **(Invited).**

International Colloquium on Equatorial and Low Latitude Ionosphere (ICELLI-2024), at Lagos, Nigeria, from 29th July - 2nd August 2024

Gopi Seemala

Machine Learning Applications for Ionospheric Studies.

Solar & Geospace Superstorm Workshop, Johns Hopkins Applied Physics Laboratory – USA, October 28 – November 1, 2024

Guru, K. Siba Kiran, S. Sripathi and Rajesh Kumar Barad

Impact of the May 10–11 Super Geomagnetic Storm on the Equatorial Ionosphere Over the Indian Region: Insights from Ionosonde Measurements.

8th Asia-Pacific Conference on Plasma Physics (AAPPS-DPP 2024), Malacca, Malaysia, Novmber 3-8, 2024

Ayushi Srivastava, Bharati Kakad and Amar Kakad

Simulation study to understand the behaviour of highly energetic charged particles in Jovian Magnetosphere.

American Geophysical Union (AGU) Fall Meeting, Washington DC, USA, 9-13 December, 2024

Bulusu, J., P. Adhitya, Yuki Obana **and A. P. Dimri**

Applicability of Direct Analytic Model (DAM) for investigating Field Line Eigen Modes from Earth and Planetary Systems.

Remya, B., A. P. Dimri, Suk-Bin Kang **and** Mei-Ching Fok

Modeling EMIC waves in the Earth's Magnetosphere during the Extreme Geomagnetic Storm of 10 May 2024.

Adhitya, P., Jayashree Bulusu, Geeta Vichare, Kazuo Shiokawa, Alexander S Potapov, Alexsey Poddelsky, Sergey Smirnov, Ian Robert Mann **and A. P. Dimri**

Characteristics of Pc1 Wave Ducted to Very Low Latitude.

Bulusu, J., Vasundhara Barde, Chinmaya Nayak, Geeta Vichare and A P Dimri

Impact of Active Geomagnetic Conditions on Stratosphere and Upper Troposphere.

Amrita Yadav, M. Ponraj, Jayashree Bulusu and A. P. Dimri

Precipitable Water Vapour (PWV) over the Indian Subcontinent Estimated from GPS Data.

STUDENTS CORNER

Ph.D. DEGREES AWARDED/SUBMITTED FOR THE YEAR 2024-25

Sr. No.	Name of the Candidate	Research Guide	Title of the Thesis	University
1.	Nilesh Chauhan	Prof. S. Gurubaran	Study on Gravity Waves in the Middle Atmosphere (awarded)	University of Mumbai
2.	Ashish Jadhav	Prof. S. Gurubaran	Study of wave coupling of atmosphere-ionosphere system (Submitted)	University of Mumbai
3.	K. Krishnapriya	Dr. S. Sathishkumar	Investigations of Vertical Coupling of the Atmosphere-Ionosphere System through Tides and Waves (Submitted)	Manonmaniam Sundaranar University, Tirunelveli
4.	Rajesh Kumar Barad	Dr. S. Sripathi	A Study on the Response of the Equatorial and Low Latitude Ionosphere under Varied Geophysical Conditions (awarded)	University of Mumbai
5.	Chandan Kapil	Dr. Gopi Seemala	Study of ionospheric irregularities, its evolution and characterization (awarded)	University of Mumbai
6.	Trunali Shah	Prof. B. Veenadhari	Characteristics of energetic particles in the Earth's inner magnetosphere during space weather events (submitted)	University of Mumbai
7.	Naresh Reddimalla	Prof. Geeta Vichare, Co-guide	Development of Numerical Solution for Atmospheric Tidal Model(Submitted)	National Institute of Technology (NIT) Warangal

Ipsita Katual

Received fellowship under SCOSTEPVisiting Scholar Program at NASA Goddard Space Flight Center (GSFC) during September 2024- December 2024

Convener, Polar Cap Patch Meeting during CEDAR 2025.

Ankita Manjrekar

Received the first prize in the Student Paper Competition at the URSI-RCRS 2024 conference.

Nilam Bhosale

Received the Young Scientist Award at URSI-RCRS 2024 conference.

DEPUTATIONS/VISITS ABROAD

Name	Country visited	Duration	Conference/Workshop/Symposium
Prof. Amar Kakad	Korea	13-21 July2024	45th COSPAR Scientific Assembly Bexco, Busan
Neetasha Arya	Korea	13-21 July 2024	45th COSPAR Scientific Assembly Bexco, Busan
Prof. Gopi Seemala	Nigeria	29 July to 2 August 2024	International Colloquium on Equatorial and Low Latitude Ionosphere (ICELLI-2024)
Sahil Pandey	Germany	1-9 August 2024	International School/Symposium for Space Simulations (ISSS-15) and nterrelationship between Plasma Experiments in the Laboratory and in Space (IPELS-16)

Name	Country visited	Duration	Conference/Workshop/Symposium
Ayushi Srivastava	Germany	1-9 August 2024	International School/Symposium for Space Simulations (ISSS-15) and Interrelationship between Plasma Experiments in the Laboratory and in Space (IPELS-16)
Dr. Priyeshu Srivastava	Japan	19-23 August 2024	Kochi Institute for Core Sample Research, Japan Agency for Marine-Earth Science and Technology (JAMSTEC)
Dr. Jayashree Bulusu	Swizerland	7-11 October 2024	Third group meeting on CSES and Swarm satellite Pi2 geomagnetic pulsation and ground signatures at International Space Science Institute (ISSI).
Ayushi Srivastava	Malaysia	3-8 November 2024	8th Asia-Pacific Conference on Plasma Physics (AAPPS-DPP2024)
Dr. Jayashree Bulusu	USA	9-13 December 2024	American Geophysical Union (AGU) Fall Meeting, Washington DC
Dr. Remya Bhanu	USA	9-13 December 2024	American Geophysical Union (AGU) Fall Meeting, Washington DC
Dr. P. Adhitya	USA	9-13 December 2024	American Geophysical Union (AGU) Fall Meeting, Washington DC
Dr. Amrita Yadav	USA	9-13 December 2024	American Geophysical Union (AGU) Fall Meeting, Washington DC
Prof. A.P. Dimri	USA	9-13 December 2024	American Geophysical Union (AGU) Fall Meeting, Washington DC
Prof. A.P. Dimri	United Kingdom	November 24 to 28, 2024	Royal Society Yusuf Hamied workshop for India and the UK. The Royal Society, London, United Kingdom

Antarctic/Arctic Expeditions

Name	Country visited	Duration	Expedition
Mr. Ramana Murthy Pradhani, Station Leader	Bharati, Antarctica	Winter	44th ISEA
Dr. Srinivas Nayak	Maitri, Antarctica	Winter	44th ISEA

DISTINGUISHED VISITORS

Prof. Abhay Karandikar, Secretary, Department of Science and Technology, Government of India, visited IIG's iconic Colaba Observatory, on 18 January 2025. His insightful interaction with the scientists and the inauguration of Colaba Research Center mark a proud milestone in advancing scientific innovation.

Floral welcome of Prof. Abhay Karandikar, Secretary, DST, by Prof. A.P. Dimri, Director IIG.

Prof. Abhay Karandikar, Secretary, DST, unveils the inauguration plaque of the Colaba Research Center in the presence of Director and Registrar, IIG, symbolising the formal commencement of this state-of-the-art geoscience facility.

Prof. Abhay Karandikar, Secretary, DST, inaugurates the Colaba Research Center with a ceremonial ribbon-cutting at Colaba, marking a significant milestone in advancing geophysical research in the country.

Planting of sapling by Prof. Abhay Karandikar, Secretary, DST, at Colaba.

Dr. S. Somanath, Chairman, ISRO, gave a talk during the inauguration of Conference on Plasma Simulation (CPS) on 11 November 2024 and had in-depth discussion with the Instrumentation team. He also visited Environmental magnetism Laboratory (EML), Instrumentation laboratory and HPC facility.

Dr. S. Somanath, Chairman of the Indian Space Research Organisation (ISRO), being briefed on the High Performance Computing Laboratory at IIG, Panvel.

Dr. S. Somanath, Chairman of the Indian Space Research Organisation (ISRO), visiting the Environmental Magnetism Laboratory at IIG, Panvel.

Dr. S. Somanath, Chairman of the Indian Space Research Organisation (ISRO), being elaborated on the earth's geomagnetic field at IIG, Panvel, in the presence of other dignitaries.

Dr. M. Ravichandran, Secretary, MOES, visited IIG for IRad 2025 conference inauguration and visited Environmental magnetism Laboratory, Instrumentation laboratory, HPC facility, during January 2025.

Dr. M. Ravichandran, Secretary, Ministry of Earth Sciences, visiting the Environmental Magnetism Laboratory at IIG, Panvel, in the presence other dignitaries.

Dr. M. Ravichandran, Secretary, Ministry of Earth Sciences, being briefed on the High Performance Computing Laboratory at IIG, Panvel.

Dr. M. Ravichandran, Secretary, Ministry of Earth Sciences, visiting the Magnetometer Sensor Laboratory at IIG, Panvel, in the presence other dignitaries.

Dr. Nat Gopalaswamy from NASA's Goddard Space Flight Center (GSFC) delivered an insightful lecture at IIG, Panvel campus on "Backreaction of the heliosphere on CMEs and Their Space Weather Consequences", on 20 December 2024. His talk shed light on the dynamics of coronal mass ejections and their impact on our space environment. He had fruitful discsussions with the IIG scientists.

Dr. Nat Gopalswamy, Scientist at the Heliophysics Division of NASA's Goddard Space Flight Center, Greenbelt, Maryland, delivering a lecture during his visit at IIG, Panvel (Top). Prof. S. Gurubaran felicitating Dr. Nat Gopalswamy (Bottom).

Dr. Nat Gopalswami visited EGRL Tirunelveli, and had interactions with the staffduring December 2024.

Prof. Sudhir Sopory, former Vice Chancellor, JNU, New Delhi visited IIGon May 1, 2024.He also visited Environmental magnetism Laboratory (EML), Instrumentation laboratory, computer section.

Dr. H.K. Pandey, Professor, Department of Civil Engineering, Motilal Nehru National Institute of Technology Allahabad, Prayagraj, visited KSKGRL on March 6, 2025 and visited the Palaeomagnetic and Petrology labs. He also had discussions with the staff members.

Dr. W.G. Prasanna Kumar, Convener and Dr. Amarnath Reddy, Director (R&D), Samskruti Adhyayan Kendra, Samskruti Foundation, Telangana, visited KSKGRL, Prayagraj during January 7-8, 2025 and interacted with staff members. They also briefed about their studies to enhance their understanding of river rejuvenation efforts, which provides valuable inputs for faculty, researchers, and students. It examines the environmental behavior of pilgrims during the Maha Kumbh 2025 and proposes strategies for mitigating plastic and non-biodegradable pollution.

Prof. A.P. Dimri, Director, IIG, felicitating Prof. Sudhir K. Sopory, Former Vice Chancellor, JNU, New Delhi, during his visit to IIG, Panvel (Top). Prof. Sudhir K. Sopory interacting with the scientists (Bottom).

Dr. W.G. Prasanna Kumar and Dr. Amarnath Reddy, Samskruti Adhyayan Kendra, Samskruti Foundation, Telangana, present a special bulletin on Mahakumbh 2025 to Dr. Gautam Gupta, Head, KSKGRL, Prayagraj, during their visit to the laboratory.

Mr. Nishith Mishra, Joint Commissioner of Police, Mumbai delivered a talk on "Sexual Harassment at Workplace (Prevention, Prohibition and Redressal)" at Panvel Campus on 17th December 2024.

Mr. Nishith Mishra, Joint Commissioner of Police, Mumbai being felicitated by Prof. A.P. Dimri, Director, IIG, during his visit to IIG, Panvel (Top). He also delivered a talk on "Sexual Harassment at Workplace (Prevention, Prohibition and Redressal)" (Bottom).

HONOURS AND AWARDS

Prof. Satyavir Singh

Convener, Commission H, URSI Regional Conference on Radio Science, ARIES Nainital, India, 22-25 October 2024.

Chaired sessions (H) URSI Regional Conference on Radio Science, ARIES Nainital, India, 22-25 October 2024.

Member, Scientific Organizing Committee, Conference on Plasma Simulation (CPS 2024) Indian Institute of Geomagnetism, New Panvel, 11-13 November 2024.

Chaired session at Conference on Plasma Simulation (CPS 2024) Indian Institute of Geomagnetism, New Panvel, 11-13 Novembe 2024.

Member, Division of Plasma Physics, Association of Asia Pacific Physical Societies (AAPPS-DPP).

Prof. Geeta Vichare

Member of Subject Expert Committee (SEC) on Earth &Atmospheric Sciences for Women in Science and Engineering Scheme (WISE) of DST.

Indian Representative in the Physical Science group of the Scientific Committee on Antarctic Research (SCAR), which is a thematic organization of the International Science Council (ISC).

Prof. Amar Kakad

Convener, Scientific session "New Perspectives on Simulations, Theories and Observations of Space Plasma Processes" in Asia Oceania Geosciences Society (AOGS) Annual Meeting, 23-28 June 2024.

Convener, Commission H, URSI Regional Conference on Radio Science, ARIES Nainital, India, 22-25 October 2024.

Convener, Conference on Plasma Simulation (CPS-2024) at IIG HQ Panvel, 11-14 November 2024.

Convener Inspiring the Minds of Post-graduates for Research in Earth and Space Sciences (IMPRESS-2025) at IIG HQ Panvel, 27 February –1 March 2025.

Chaired sessions (Commission H) URSI Regional Conference on Radio Science, ARIES Nainital, India, 22-25 October 2024.

Prof. Anand S.P.

Paper entitled "Comparison of satellite derived gravity models with ground data" by Tabish Khan, S.P. Anand, S.K. Begum has been awarded Prof. D. Lal Best paper of IGU for the year 2024.

TRAINING IMPARTED

Gautam Gupta

Ankit Kumar, student of M.Sc. (Tech.) Applied Geophysics, Semester- II, Indian Institute of Technology (Indian School of Mines) Dhanbad, has successfully completed his summer training program on the topic *"Assessment of aquifer characteristics using resistivity data of the Nandurbar region, Nandurbar District, Maharashtra, India"*during May 15 to July 15, 2024.

Amith Krishnan, Dept. of Geology, Central University of Karnataka completed dissertation work on *"Palaeomagnetic studies of Dalma volcanic, eastern India"*, during February-May 2024.

Anand, S.P.

Gayathri Mokashi, student of Applied Geophysics, Indian Institute of Technology Kharagpur carried out summer internship during May-July 2024 on the topic *"Mapping dip equator over Indian Ocean utilizing satellite magnetic data"*.

Prasanna Mahavarkar

M.Sc. student underwent summer training on *"Preparation of Paints for Optical Applications"* for two months (May 21–July 21, 2024).

Rajesh Singh

Mr. Omveer Singh, Department of Physics, Sant Longowal Institute of Engineering and Technology, Sangrur, Punjab, completed his M.Sc. summer project on *"Space Weather"*.

Rajesh Singh and Ramesh K. Nishad

Ms. Pratikshya Behera, Department of Geology, Central University of Punjab, Bathinda, Punjab, completed her M.Sc. summer project on *"Magnetic Fabric and Oriented Petrographic Studies of Lava Flows in and around Jabalpur and Shahpura Area of Eastern Deccan Volcanic Province, India"*.

Rupesh N. Ghodpage

M.Sc. student from the Department of Space Science, Shivaji University, Kolhapur, completed his dissertation project work on photometer data analysis under his supervision.

K. Deenadayalan

Pradeep, S., Manonmaniam Sundaranar University, Tirunelveli, completed dissertation work on *"Rock-magnetic studies of archaeological artefacts collected from Maharashtra's historical sites"*, January to April 2025.

B.V. Lakshmi

Nidhin, P., CUSAT, Kochi, completed dissertation work on *"Stress analysis, Anisotropy of magnetic susceptibility and rock magnetic properties of sediments from the Dhubri fault region, Assam"*, during January to April 2025.

B. Remya

Guided Ms. Aditi Krishna Gharat, M.Sc. student of Karmaveer Bhaurao Patil College, Vashi, Navi Mumbai, Maharashtra, for the summer project on "Understanding the drivers of non-storm time EMIC waves in Earth's Magnetosphere".

PARTICIPATION IN SPECIALIZED WORKSHOPS/TRAINING COURSES

Parihar, N.

Participated in One-day Brainstorming Workshop on *'Monitoring the Atmospheric Lightning over India'*, Organized by NRSC (ISRO) on 18 April 2024.

Gopi Seemala

Attended 'INSA-NCGG LEADS-2024 training programme' at INSA, New Delhi , during 01-07 April 2024. He also attended the training course on 'Administrative Vigilance- Role of IO/ PO' at ISRM Delhi during 30 June-5 July 2024.

Remya Bhanu

'Programme on Public Procurement Principles', at ASCI Hyderabad during 23-29 June 2024. She also attended the Training on big data analytics, at ISTM, Delhi, during 01-05 September 2024.

Tulasiram S.

Attended Training on administrative vigilance at INSA New Delhi, during 31 July-2 August 2024.

Chinmaya Nayak

Attended Training programme on public procurement at Hyderabad during 25-30 August 2024.

Swati Kore and Pankaj Vaskala

Training related to recruitment, roster etc. at Delhi University, during 15-16 July 2024.

Swapnali Chavan, Gaurav Kumar and Sujit Patil

Training program on Excel at ISTM, Delhi during 4-7 August 2024.

Pankaj Vaskala

Attended the Training on Procurement, at ISTM, Delhi, during 1-3 September 2024. He also attended Training on Noting & Drafting, at ISTM, Delhi, during 8-10 September 2024.

Priyeshu Srivastava

Attended training programme on 'Public Procurement Principles', at ASCI Hyderabad during 23-27 September 2024.

Roopa Lathe

'Training Course Communication Skills' at ISTM Delhi on 9 December 2024.

Nitish Srivastava

Noting & Drafting Training' at ISTM, Delhi during 9-11 March 2025.

Mahendra Doiphode, Sunil Kumar Jha and Rakesh Nimje

'Cyber Crisis Management Plan (CCMP)' CERT-In, on 20 December 2024 (Online).

Ravindra Bhosale

Training course on 'Generative AI in chat GPT & Google Gemini (MSME)' CERT-In, on 18 December 2024 (Online).

OFFICIAL LANGUAGE (HINDI)

Rajbhasha Adhikari* : *Priyeshu Srivastava

Asst. Director (Official Language)* : *J. Kamra

Member* : *Ganesh Kalghuge

In compliance with the provisions of the Official Languages Act, Rules made thereunder, the Annual Programme, and other directives issued from time to time by the Department of Official Language, the Institute regularly undertakes some important and special activities to enhance the progressive use of official language Hindi among its staff members.

This year Hindi Day-2024 and the Fourth All India Official Language Conference were celebrated on 14-15 September 2024 at Bharat Mandapam, New Delhi. Dr. Priyeshu Srivastava, Official Language Officer participated in this conference on behalf of the institute

Hindi Day-2024 and 4th All India Official Language Conference held on 14 September 2024 in New Delhi.

Dr. Priyeshu Srivastava and Dr. Chinmaya Nayak, participated in the 'Second All India Scientific and Technical Official Language Seminar' organized by Aryabhatta Research Institute of Observational Sciences (ARIES), Nainital on 20-21November, 2024 and presented research papers/articles related to research and other work going on in the institute.

Dr. Chinmay Nayak was honored with a memento for presenting a research paper.

Apart from this, Hindi Section participated in the workshop on 'New Parliamentary Official Language Questionnaire Problems and Solutions' organized by Town Official Language Implementation Committee (TOLIC), Navi Mumbai and Konkan Railway on 28 May 2025.

During the year, the Institute actively participated in various competitions organized by the TOLIC, Navi Mumbai. Directorate of Construction Services and Estate Management organized "Constitution Day 2024" celebrations on 26 November 2024 in which Dr. Ganesh Kalghuge participated on behalf of the Institute. Shri Varun Dongre of the Institute received the Inspiration Award in the "Hindi Story Writing Competition" organized by Directorate of Construction Services and Estate Management under the aegis of TOLIC, Navi Mumbai.

Participation of Institute staff in various competitions organized by TOLIC, Navi Mumbai.

Central Translation Bureau, New Delhi and Bharat Petroleum Corporation Limited, Mumbai organized a 5 day special Technical Translation training program from 2-6 December 2024 in which Dr. Ganesh Kalghuge participated on behalf of the institute.

Candidates of 5 days Special Technical Translation Training Programme organized by Central Translation Bureau and Bharat Petroleum Corporation Limited, Mumbai.

Prof. Dr. Amar Kakad and Dr. Priyeshu Srivastava participated on behalf of the institute in the one-day Official Language Workshop-cum-Training on 20 December 2024 organized by the Department of Science and Technology, New Delhi.

Ms. A. Dhanalakshmi, Joint Secretary and all trainees at the One Day Official Language Workshop-cum-Training organized by DST, New Delhi

The Institute has celebrated 'Hindi Month' during this period and various competitions like crossword puzzle, typing, Hindi essay writing, General Knowledge and scientific writing competitions in Hindi language were organized in which staff members, Scientists and Researchers participated. A total of 36 prizes were given in these competitions. The Institute celebrated World Hindi Day on 10 January 2025, during which the winners of the competitions under Hindi month were awarded with prizes by Prof. S. Gurubaran.

World Hindi Day and Hindi Month award distribution Programme held on 10 January 2025

As a part of the responsibilities of the Official Language Department, a joint regional official language conference was organized on 17 February 2025 at JECC, Sitapura, Jaipur Rajasthan, combining North-1, North-2, Central and West regions. Dr. Ganesh Kalghuge, Ms. Amina Kaddus Khan, Mr. Amit Kumar and Mr. Ravindra Vitthal Bhosale participated in this conference.

The Hindi House Magazine "SPANDAN" is being published on a six-monthly basis (2 issues annually), which includes both scientific & technical articles. The magazine is being distributed to various scientific & educational institutes/ universities in the country.

During the year, four Hindi Workshops were organized on different topics for the staff of the Institute, in which total 153 members participated.

Session on "Medical Reimbursement" during the Hindi Workshop.

Session on "Cyber Security" during the Hindi Workshop.

Session on "Government e-Marketplace (GeM)" during the Hindi Workshop

Under the annual incentive scheme, during the Annual Day Celebrations, 10 staff members of the Institute were awarded with cash prizes for doing their official work in Hindi throughout the year. Apart from this, 5 children of employees were awarded with cash prizes for scoring more than 70% in the Hindi/Sanskrit subjects in 10th Class.

Members honored with cash awards by the Institute under Annual Incentive Scheme.

Director, Official Language Officer, Assistant Director (OL) and Senior Translation Officer of the Institute attended various meetings/seminars held under the aegis of TOLIC, Navi Mumbai and other organizations.

Hindi crossword competition organized for all member offices of TOLIC:

Indian Institute of Geomagnetism, New Panvel, Navi Mumbai, under the aegis of Town Official Language Implementation Committee, Navi Mumbai, organized a Hindi crossword competition on 21 March 2025. A total of 27 participants from the member offices of TOLIC participated in this competition.

SCIENCE OUTREACH ACTIVITIES

Chief Coordinator: Chinmaya Nayak

Member: Priyeshu Srivastava, Madhavi Jadhav, Jitendra Kamra, B. I. Panchal, R. Nimje, Mahendra Doiphode, Varun Dongre, Shailaja Gandla, Amrita Yadav

The Indian Institute of Geomagnetism has been actively engaged in promoting fundamental concepts of space science and geomagnetism to the general public through a variety of outreach initiatives. During this period, numerous schools and colleges visited IIG headquarters, regional centers, and geomagnetic observatories. Students and faculty members were introduced

to core topics such as the science of geomagnetism, the functioning of geomagnetic observatories, GPS technology, Sun-Earth interactions, atmospheric science and its environmental impact, geotectonic research, Antarctic expeditions, and other related activities conducted at IIG. The public outreach activities are carried out in local regional languages to reach out a greater number of young students coming from the grassroots level. The quiz and slogan competitions, comic books, rock display, audio-video shows are the common features of the public outreach program. IIG's public outreach team work hard to make common people and students aware about the Earth and space science related research.The science outreach activities are regularly conducted at IIG's regional laboratories and magnetic observatories across the nation. Centre wise student visit chart provides detailed statistics of these visits, covering the period from April 2024 to March 2025.

Prof. A.P. Dimri, Director, IIG, addressing college students during an outreach program at IIG Panvel campus.

College students and staff members along with Prof. A.P. Dimri during a photo-session.

Dr. Priyeshu Srivastava delivering a popular talk to college students at IIG, Panvel.

Students being explained the concepts of geomagnetism and allied fields through posters during a visit of college students.

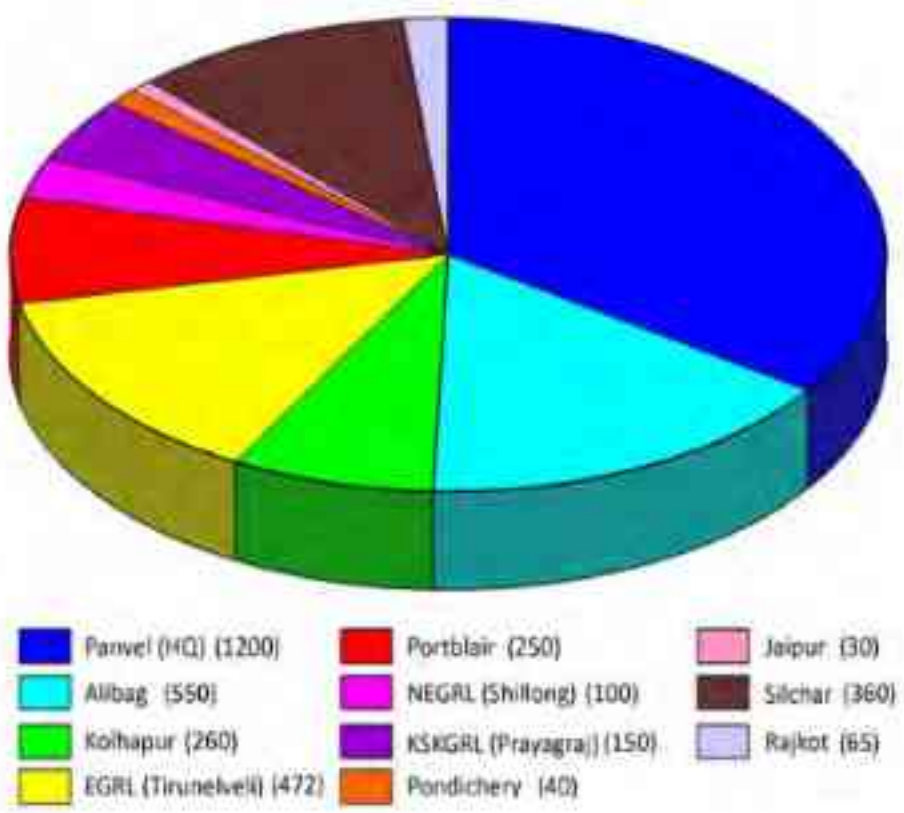
College students visiting the Environmental Magnetism Laboratory.

College students being introduced to the working principles of magnetometers during an educational visit.

Students visit the historic Colaba Observatory and attend an interactive lecture on geomagnetic field observations and their significance.

Enthusiastic college students observing the Sun through telescope with protective solar filters at IIG Panvel Campus.

Centre-wise student visit chart



Senior citizens visit the Alibag Magnetic Observatory and explore various geomagnetic instruments, gaining insights into their functions and the observatory's role in space weather monitoring.

NATIONAL SCIENCE DAY2025

Every year National Science Day is celebrated in India on 28th February to commemorate the discovery of the Raman Effect by Sir C.V. Raman. The day is an opportunity to celebrate the contributions of Indian scientists to the field of science and technology and to promote scientific temper in the society. It is a celebration of the scientific achievements of our past, present and future. This year in 2025, the theme was "Empowering Indian Youth for Global Leadership in Science & Innovation for Viksit Bharat". National science day was celebrated at IIG on 28 February 2025 at HQ and all its regional laboratories and MOs.

School students participating in the Sit and Draw Competition (Top) and the Essay Writing Competition (Bottom) during the Science Week 2025 celebrations at IIG, Panvel.

Students proudly display their drawings and paintings during the Science Week celebrations 2025.

In view of this, various competitions such as drawing, essay writing were arranged for school students on 20th February at IIG HQ Nearly 120 students from 8 different schools participated in these competitions. National Science Day program a popular talk by Chief Guest Dr. Laxman Singh Rathore, Former DG IMD, New Delhi and Prof. Madhav Rajwade, Principal, Sathaye College, Mumbai, was arranged on 28 February 2025. Nearly 250 students and teachers from various colleges /schools, IIG staff and research students attended this talk and took keen interest in the subject by asking many questions. Director Prof. A.P. Dimri addressed the gathering and motivated young minds by his speech. Prizes were distributed to the winners of competitions. In the afternoon session, students visited Environmental Lab, GPS lab, Instrumentation lab, in the Institute and enjoyed learning, gathering information about various research activities at IIG. Scientific posters explanation and spot Quiz session were arranged for students. They also enjoyed Sky observation through telescope installed at IIG.

Prof. A.P. Dimri, Director, IIG addressing during the National Science Day 2025 celebrations.

Popular talk delivered by chief guest Dr. Laxman Singh Rathod during National Scince Day 2025.

Prof. Madhav Rajwade, Principal, Sathaye College, Mumbai addressing the gathering during the National Science Day 2025.

Prize winners of various competitions held during Science Week 2025 celebrations.

National Space Day

The government of India has declared August 23, as a "National Space Day" to celebrate the remarkable success of the Chandrayaan-3 Mission. The first National Space day is celebrated at IIG and its regional centres on 23 August 2024. In view of this event, popular talk by Prof. A. N. Ramaprakash, Senior Scientist, IUCAA, Pune was arranged along with several other science outreach events and spot quiz competitions related to "Indian Space Missions".

The first National Space Day was celebrated on 23 August 2024 at IIG and its regional centres to commemorate the success of the Chandrayaan-3 Mission. Prof. A.P. Dimri, Director, IIG addressed the gathering.

A popular talk by Prof. A. N. Ramaprakash, Senior Scientist, IUCAA, Pune, was organised during the National Space Day celebration.

A group photo of the dignitaries and participants of National Space Day.

India International Science Festival (IISF 2024)

IIG also participated in the India International Science Festival (IISF 2024) at Indian Institute of Technology Guwahati during 30 November to 3 December 2024. Theme of this year's IISF was "Transforming India into an S&T driven Global Manufacturing Hub". Many dignitaries and school/colleges students visited IIG posters exhibition and interacted with our researchers. As a part of science outreach programme IIG researchers published approx. 7-8 research stories in DST media cell during this period.

Prof. Ashutosh Sharma, being briefed on IIG's research activities through posters during his visit to the IIG pavilion at IISF, Guwahati.

Team IIG with Prof. Abhay Karandikar, Secretary, DST, during his visit to the IIG pavilion at IISF, Guwahati.

ERP & COMPUTER SERVICES

Chief Coordinator : ***Remya Bhanu***

Members : ***Mahendra Doiphode, Tejashri Bari, Nanda S. Shah***

Computer Section

The firewall installation was successfully completed and VPN connectivity enabled with HQ LAN at MO Kolhapur and MO Sri Vijayapuram. Successfully completed the firewall installation and other local network related works (wired and fiber connectivity) and also enabled VPN connectivity with HQ LAN at MO Gulmarg. The detailed inspection of the IT infrastructure at EGRL, Tirunelveli was carried out by the IT team under the cyber security point of view. Similar inspections of other regional centers are done remotely. Cyber security guidelines are issued to all staffs and students across IIG's centers for implementation.

All necessary IT related technical support was provided during the IMPRESS, CPS 2024 and IRAD conferences organized by IIG. Cert-in organized online cyber security related training programs were attended by all staffs in the section to stay updated with latest cyber security technologies and guidelines. The center also provided support to staff members to get registered and access various online courses on Karmayogi Bharat portal. As a routine practice uninterrupted IT services are provided to the staff members. Annual security audit of the IIG website is also conducted from the CERT-In empaneled Security auditor. All necessary Cyber security practices are

implemented and followed as per cyber security guidelines by the MeitY.

ERP

Since January 2019, IIG has been utilizing an ERP system to streamline processes, enhance automation, and improve operational efficiency. Various HRD-related modules such as HRMS, Leave Management, Tour Advance, LTC Advance, CEA, Property Declaration, and Office Attendance are actively in use by staff and students, ensuring smooth functionality and ongoing upgrades.

Recent enhancements include the integration of APAR forms, allowing employees to download prefilled forms, view APAR gradings, and generate tour settlement forms with prefilled advance data. Additionally, Touchless Biometric System with Face Recognition Technology has been introduced and effectively used for office attendance across all IIG offices, regional centers, laboratories, facilities, and observatories, with seamless ERP integration for employee access to attendance records.

Looking ahead, IIG aims to activate procurement modules, including indent generation and requisition, to optimize stores and purchase procedures. Beyond ERP, NIC forms are utilized for efficient data collection on initiatives such as iGOT and the NPS portal. The institute has also adopted online recruitment processes, covering application submission, hall ticket generation, computer-based tests, and results processing.

To safeguard data, the ERP portal is secured with routine backups, disaster recovery measures, and application security enhancements. A security audit conducted by a CERT-IN empaneled auditor has been successfully completed, and SSL certification ensures data protection and system reliability.

LIBRARY AND DOCUMENTATION

Chief Coordinator : ***Satyavir Singh***
Coordinator : ***Smita Chandra***
Members : ***B. I. Panchal, A.Selvarajeswari, Sachin Jadhav, Poonam Mishra***

Library:

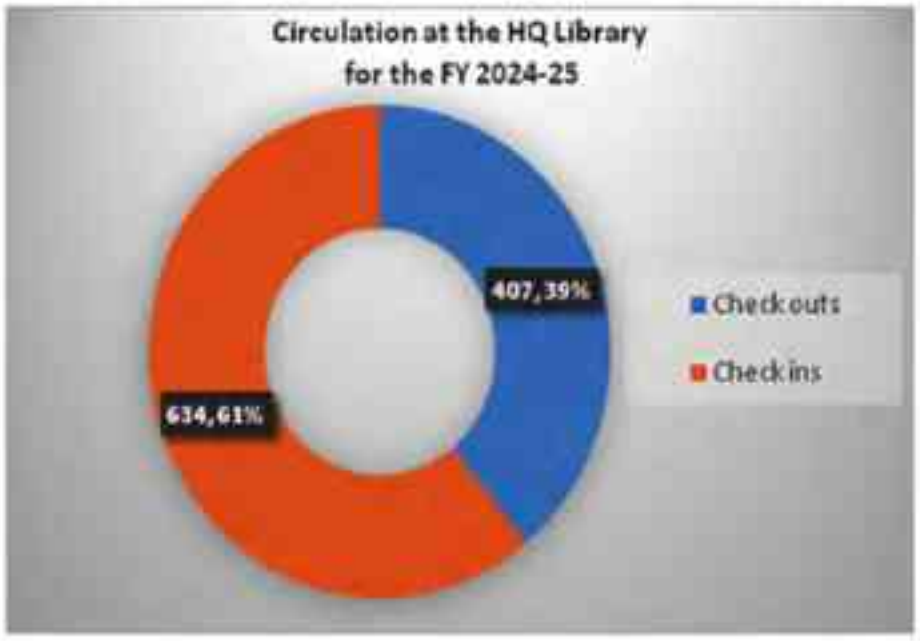
The library of the Indian Institute of Geomagnetism continued with its task of collection development and management at the headquarters and its various centers and observatories. Along with its routine activity of organization and dissemination of information sources via open source library management systems, the library strived to enhance its services with the help library and the institute staff.

Some of the activities carried out by the library during the period include:

1. Acquisition of Library books, including Hindi books, based on the need, demand, subject relevance, availability of previous versions in the Library, and price.
2. Acquisition of books for students from their contingency grant, based on approval by their guides.
3. Guidelines were formulated for book acquisition from the contingency grant for the next FY.
4. The Library received 154 Abstract submission forms from IIG staff and students and processed the same.
5. Stock verification as an annual library activity was carried out, and reports were forwarded to the concerned.
6. AMCs for various Library software and services were initiated for uninterrupted user services.
7. Timely reports were provided to the institute regarding publications from IIG scientists and students.
8. Serials management was restricted to the ongoing One Nation One Subscription (ONOS) deliberations and implementation.
9. The Library celebrated the Hindi Mah with Hindi books displayed in various subjects in the Library.

Some of the ways in which the physical library was used by Library Patrons:

1.A Circulation Figures



Physical usage of the library during 2024-25

1.B Circulation Figures

Category of Staff	Total (Check-ins/outs & renewals)
Academic Staff	164
Technical Staff	46
PhD Students	577
Research Associates	47
IIG Admin Staff	23
Total	**857**

Circulation statistics by category of IIG staff for the FY 2024-25

2. The Average Daily Footfall for the HQ Library was approximately 45.
3. Spiral binding for approximately 70 reports for various project reports and GC/RAC agenda items was done.
4. The HQ Library was used by 21 students from various universities across the country who came for their internship.

Some of the ways in which the digital library was used by Library Patrons:

Ways in which the library is used digitally

Initiatives for the Future:

1. Setting up one server for both the OSS, KOHA, and DSpace
2. Fully functional KOHA library management system with enhanced features, incorporating various functionalities and user training.
3. Getting SSL set up for both KOHA and DSpace.
4. Enabling standards for interoperable metadata.
5. Use of online tools for thesaurus and classification.
6. Enhanced library patron engagement for better library awareness and usage.

The Documentation Section provides services like designing, printing, photography, editing, scanning and digitizing etc. to the various activities of the Institute.

a) **Science Outreach Activities**

- In house designing and printing of scientific posters and banners for Science Outreach Activities.
- Designing and printing certificates for the winner students of various competitions held during science week.
- Provide e-copies and printed scientific posters to all observatories for science outreach activities whenever required.
- Comic Books printing, Dr. Moos biography book and Coffee Table book (whenever required).

b) **IIG Website**

- Photographs of all Institute eventsfor uploading on the website.
- Updated the Institute's observatory network map for the website.

c) **Symposiums/Conference/Workshop**

Following Conferences/Workshopsorganized by IIG during year 2024-25

1. Conference on Plasma Simulation (CPS-2024) Workshop 11-13 November 2024
2. 7th Conference on Indian Radar Meteorology (iRAD – 2025)
3. IMPRESS-2025 (27 February - 01 March 2025)
4. Workshop Atmosphere - Ionosphere Dynamics: Observations and Data Analysis (AIDON 2024) 03 January 2025

Provided following services during the above-mentioned Conferences/workshops:

Making Flyer design for website; Design and in-houseprinting of Banners, Invitation cards, Valedictory function cards, Abstract books/Lecture notes, ID cards and Participation Certificates.

d) **Rajbhasha Hindi**

- *Spandan* Gruh-patrika was published in-house for the first time.
- Volumes 31 and 32 of *Spandan* were designed and printed in-house, with 20 copies each.
- Photography and banner preparation were carried out for Hindi Mah and International Hindi Day celebrations.

e) **IIG Publication**

- Editing scientific figures and photographs to the required resolution for printing the Annual Report.
- Updated the organisational chart of IIG and staff profile for the bilingual Annual Report.

f) **Scientific/Technical support**

- Edited, modified, and designed new scientific figures for scientific and technical staff as per their requirements.
- Scanned and printed topographic maps to support scientific fieldwork.
- Designed and printed over 68 posters and banners for various events, workshops, and conferences (EMIW, URSI, Malaysia Workshop, IGU, AGU, Avishkar).
- Provided 5 scientific posters each to MO Gulmarg, MO Nagpur, and MO Jaipur for science outreach activities.
- Created 12 high-resolution (6×6 feet) scientific images to beautify the outer wall of the Colaba Observatory Campus.
- Provided photography support for all events celebrated at IIG.
- Designed and printed mark sheets for Junior Research Fellows (JRF) as and when required.

SPECIAL EVENTS

Conference on Plasma Simulation (CPS-2024),11-13 November 2024

The modelling of plasma sources and processes in space and laboratory plasma plays a central role in the field of plasma research and technology development. In view of bringing Indian plasma researchers from various branches of computational plasma physics on one platform, IIG hosted the 4th Conference on Plasma Simulation (CPS-2024) at Panvel Campus Navi Mumbai during November 11-13, 2024. The conference was inaugurated on November 11, 2024. More than 100 delegates from various academic and research institutions, with a significant representation of students and postdoctoral fellows, have participated in it. The inaugural session began with a welcome address by Director, IIG. One of the Convenors, Dr. Sarveshwar Sharma (IPR Ahmedabad) gave an overview of the CPS. The chief guest of the inaugural session, Dr. S. Somanath, Secretary, Department of Space and Chairman, ISRO, delivered the inaugural address. In his address, he acknowledged and praised the organizing committee of CPS for bringing together the leading experts from various branches of computational plasma physics on one platform to exchange various simulation codes developed in our country and applications of those to advance our knowledge in space and laboratory plasma physics and related technologies. Prof. Dipankar Banerjee (Director, IIST Thiruvananthapuram), the keynote speaker, delivered

a talk on "Heliophysics as a Plasma Laboratory." Prof. Amar Kakad, Convenor CPS, presented an overview of scientific activities in the planetary space plasma environments at IIG. The main themes of the CPS include (1) Methods for plasma simulations, (2) Simulation of space & astrophysical plasmas, (3) Plasma surface interaction, (4) Magnetic and inertial fusion, (5) Micro discharge: dc, rf, microwave, (6) Plasma propulsion and aerodynamics, (7) Industrial applications of plasma. The CPS-2024 includes 25 invited talks and 67 posters on contributed abstracts. Participants from 36 research/academic institutes/ universities participated in this conference. The conference concluded with the valedictory function, wherein Shri Sanjay Wandhekar, Head C-DAC (Pune), delivered a valedictory talk on the topic "Supercomputing Initiatives in India under National Supercomputing Mission and Way Forward." He interacted with the plasma simulation community regarding the computational requirements for simulating the various aspects of plasma systems. The guest of honour, Dr. T. P. Das (Program Director, ISRO HQ), suggested the development of a national platform for keeping the originally developed codes that can be accessible to the plasma simulation community. The conference ended with a vote of thanks.

Welcome address by Prof. A.P. Dimri, Director, IIG, at the inaugural session of the 4th Conference on Plasma Simulation (CPS-2024) at Panvel, Navi Mumbai.

The chief guest of the inaugural session, Dr. S. Somanath, Secretary, Department of Space and Chairman, ISRO, delivered the inaugural address.

Keynote speaker, Prof. Dipankar Banerjee, Director, IIST, Thiruvananthapuram, delivered a talk on "Heliophysics as a Plasma Laboratory", during the CPS-2024.

Dr. S. Somanath and other dignitaries planting saplings during the CPS-2024 at IIG, Panvel.

7th Conference on Indian Radar Meteorology (iRAD – 2025), 6-8 January 2025

The 7th Conference on Indian Radar Meteorology (iRAD – 2025) was hosted by the Indian Institute of Geomagnetism and was organized by the Indian Meteorological Department (IMD) from January 06 to 08, 2025. The Secretary, Ministry of Earth Sciences, Dr. M. Ravichandran has inaugurated the iRAD-2025 conference and Dr. Mrutyunjay Mohapatra, Director General of Meteorology, IMD has graced the occasion and delivered the keynote address. In this 3-day conference, about 150 research papers have been presented (oral and poster) in a total of 10 scientific sessions. Besides this conference, a 1-day Pre-conference Short Course on Radar Meteorology had been organized on 5th January 2025 for graduate students and young scientists.

A group photo of dignitaries and participants during the iRAD-2025 conference, inaugurated by Dr. M. Ravichandran, Secretary, Ministry of Earth Sciences. Dr. Mrutyunjay Mohapatra, Director General of Meteorology, IMD, graced the occasion and delivered the keynote address.

Atmosphere-Ionosphere Dynamics: Observations and Data Analysis Workshop (AIDON 2025), 3 January 2025

IIG organized a Workshop on "Atmosphere-Ionosphere Dynamics: Observations and Data Analysis (AIDON 2025)" in collaboration with Shivaji University, Kolhapur, at Shivaji University Campus, on 3rd January 2025. The workshop objective was to provide a comprehensive understanding of the dynamics of the atmosphere-ionosphere system, focusing on observational techniques and data analysis methods. The study of the lower atmosphere-ionosphere system is crucial for improving space weather prediction models, which play a key role in safeguarding technological systems like satellite-based navigation and communication systems. A unique geographic location of Kolhapur offers better platform to examine space weather processes over the Indian longitudinal sector. With excellent research capabilities both the IIG's MF Radar Centre, Kolhapur and Shivaji University Space Physics Centre located at Panhala, Kolhapur are contributing to advance our understanding in the field of space weather.

In this workshop, about 120 young researchers, postgraduate and Ph.D. students from different national research labs, universities and institutions have participated. Prof. R.G. Sonkawade, HOD, Dept. of Physics, Shivaji University played a key role in initiation of the workshop and the idea was channelize by Prof. A.P. Dimri, Director, IIG. The support and guidance of Pro-VC Prof. P.S. Patil and Honorable VC Prof. D.T. Shirke in shaping the workshop is vital. Through this initiative, IIG and SUK inspired the next generation of scientists, fostering innovation and scientific inquiry in space science and geomagnetism.

Prof. A.P. Dimri, Director, IIG, lighting the ceremonial lamp at the inauguration of the Workshop on "Atmosphere-Ionosphere Dynamics: Observations and Data Analysis (AIDON 2025)," organised by IIG in collaboration with Shivaji University, Kolhapur, on 3rd January 2025 at the Shivaji University Campus.

Participants at the AIDON 2025 conference held at Shivaji University, Kolhapur, organised by IIG in collaboration with Shivaji University.

Inspiring the Minds of Post-Graduates for Research in Earth and Space Sciences (IMPRESS- 2025), 27 February-1 March 2025

To attract, motivate, and train young talent to undertake research in geomagnetism and related fields, IIG organizes the "IMPRESS" program every year for post-graduate students from universities. IMPRESS-2025 was organized at the Panvel campus from February 27 to March 1, 2025. 51 bright M.Sc. students from 28 Indian universities were selected to participate in this prestigious program. During the three-day event, the students were provided with lodging and engaged in various academic and interactive activities. The program included inspiring lectures by eminent dignitaries from well-known research and educational institutions. The event commenced with an inaugural talk by Dr. Laxman Singh Rathore (Former DG, IMD, New Delhi), followed by a keynote address delivered by Dr. Tirtha Pratim Das (Program Director, ISRO HQ, Bengaluru) and a welcome address by Prof. A.P. Dimri (Director, IIG). The valedictory function featured addresses by Dr. R. Sridharan (Former Director, SPL, VSSC) and Prof. D. C. Srivastava (IIT Roorkee). Throughout the event, participants attended a total of 23 insightful lectures covering a wide range of topics in Earth and Space Sciences. A special session on the theme "Space Science Exploration in India" in coordination with ISRO was organized, which provided glimpses of India's Space programs to the participants. This session covered various topics, namely, Solar system exploration in India, Advanced technologies for future planetary exploration. Lunar exploration of India, Mars exploration, and Planetary protection. In addition to the talks, Lab visits and sky observation events were also arranged for the student participants. The event was a resounding success, with participants expressing great satisfaction with the knowledge gained and the guidance received from esteemed speakers. The exposure provided by IMPRESS-2025 has motivated these young minds to pursue high-level research careers in Indian scientific institutions, fostering future contributions to the nation's scientific progress.

Prof. A.P. Dimri, Director, IIG, delivering the welcome address during IMPRESS-2025, organised at the IIG Panvel campus from February 27 to March 1, 2025.

Inaugural talk by Dr. Laxman Singh Rathore, Former Director General, IMD, New Delhi during IMPRESS-2025.

A group photo of dignitaries and participants at the IMPRESS-2025.

The valedictory function featured an address by Dr. R. Sridharan, Former Director, Space Physics Laboratory (SPL), VSSC.

MoU between IIG and ISRO

IIG and Indian Space Research Organisation (ISRO), signed an MOU for scientific collaboration in the domain of space science, technology and exploration, on 4 September 2024. The event took place in ISRO Headquarters, Bengaluru,

and was presided by Dr. Somanath S., Chairman, ISRO / Secretary, DOS. The MOU was signed by Shri Shantanu Bhatawdekar, Scientific Secretary, ISRO from the ISRO side, and Prof. A.P. Dimri, Director, IIG, from the IIG side. This collaboration will facilitate formulation of joint programme in the scientific understanding of the Sun-Earth connection, as well as exploration of space.

Signing of the MoU between IIG and ISRO, presided over by Dr. S. Somanath, Chairman, ISRO and Secretary, Department of Space. The MoU was signed by Shri Shantanu Bhatawdekar, Scientific Secretary, ISRO, and Prof. A.P. Dimri, Director, IIG.

Brainstorming workshop on integrated paleolimnological studies

A "One-day seminar and brainstorming workshop on integrated paleolimnological studies" was organized on 24 December 2024. The meeting has in-person participation of Prof. Sanjeev Kumar, Geosciences Division, PRL, Ahmedabad, Prof. Prasanta Sanyal, Department of Earth Sciences, IISER Kolkata, Prof. Gh Jeelani, School of Earth & Environmental Sciences, University of Kashmir and Dr. Karthick Balasubramanian, Agharkar Research Institute, Pune. Dr. B.V. Lakshmi, Dr. K. Deenadayalan, Dr. Priyeshu Srivastava and Dr. Priyanka Singh from IIG had participated in the meeting. Dr. Dewashish Upadhyay, IIT Kharagpur and Prof. Suraj Mal, JNU, New Delhi had participated online. A detailed discussion was carried out on various methods applicable to the paleolimnological studies of the lakes including chronology, organic and inorganic geochemistry and paleomagnetic studies. The meeting was followed by the scientific talks from the distinguished dignitaries on various topics of lake studies including diatoms and isotopic studies.

Dignitaries and participants of the one-day seminar and brainstorming workshop on integrated paleolimnological studies held on 24 December 2024.

World Environment Day – June 5, 2024

World Environment Day was celebrated on 5-6th June 2024 at H.Q. Panvel campus. On this occasion IIG hosted Padmashree Prof. G. D. Yadav, former Vice Chancellor of ICT Mumbai, as the chief guest and Prof. P. S. Sunil, Dept. of Marine Geology and Geophysics, CUSAT, Kochi as the guest of honour. As a part of this program, popular talks and tree plantation by invitee were organized on 5th & 6th June 2024 at IIG. Nearly 30-35 school students along with IIG staff, research students participated in this event. World Environment Day was also celebrated at all regional laboratories and magnetic observatories.

Prof. A.P. Dimri, Director, IIG, addressing the gathering during the celebration of World Environment Day.

Prof. G. D. Yadav, former Vice Chancellor, ICT Mumbai, delivering the keynote address during the celebration of World Environment Day.

Planting of a sapling by Prof. G. D. Yadav during World Environment Day celebrations.

Earth Day Celebration, 22 April 2024

Earth Day was celebrated on 22 April 2024 at HQ Panvel and Dr. Priyeshu Srivastava delivered a talk on "Understanding the Impacts of Humans on Earth's Ecosystem". On the occasion of Earth Day, multiple activities were organized at EGRL Tirunelveli; KSKGRL Prayagraj and NEGRL Shillong.

World Earth Day celebrations at IIG featured special lectures, campus cleaning activities, and group photographs with guests.

International Day of Yoga –June 21, 2024

IIG enthusiastically celebrated the 10th International Day of Yoga (IDY) on 21st June 2024 with participation from IIG's research scholars, research associates, staff and their families. Two Yoga Karyashalas were conducted as per the Common Yoga Protocol by Ministry of Ayush, at the Panvel campus. Similar activity was conducted at all the magnetic observatories and regional laboratories. A lecture on 'Yoga for Self and Society' was organized at Panvel campus for the research scholars, research associates, staff and their family.

Participants performing yoga during the International Day of Yoga at IIG.

Nashamukt Bharat 2024

A pledge for Nashamukt Bharat was taken by IIG staff, research scholars and research associates at HQ, Panvel on 13 August 2024.

Staff members taking the "Nashamukt Bharat" pledge at IIG Headquarters, Panvel.

Vigilance Awareness Week 2024

As a part of the observance of the "Vigilance Awareness Week 2024", a walkathon was undertaken by the employees and research scholars of IIG to create awareness among the masses.

A two-day workshop was conducted during 23-24 September 2024. Shri. K. Padmanabhan, Legal advisor (retd), DAE has delivered two seminars on (i) Ethics and Good Governanceand (ii)Public Procurement – Vigilance Aspects.

Another two-day workshop was conductedduring 28-29 October 2024. Dr. Bhushan Kumar Upadhyay, IPS (Retd.) has delivered two seminars on (i) Culture of Integrity for Nation's Prosperity and (ii) Mind management.

Address by Prof. A.P. Dimri during observance of Vigilance Awareness Week at IIG.

Chief Guest delivering a special lecture during observance of Vigilance Awareness Week at IIG.

Vigilance Awareness Week march by staff and students of IIG.

Swachhata Abhiyan

IIG celebrated Swachhata Pakhwada during 1-15 May, 2024.

IIG undertook the Swachhata Hi Seva 2024 Campaign during 17th September- 2nd October 2024.

Cleanliness activities conducted by staff and students during Swachchata Pakhwada at IIG.

Staff and students of IIG taking the Swachchata Pakhwada pledge.

Constitution Day 2024

To celebrate 75 years of India's Constitution, IIG hosted two inspiring talks on 20 December 2024:

Prof. Ashutosh Mishra spoke on Research & Integrity.

Hon. Justice Mr. Krishan Pahal shared insights on Constitutional Values in Contemporary Times.

A tribute to knowledge, ethics, and democracy!

Prof. Ashutosh Mishra speaking on "Research & Integrity" and Hon. Justice Mr. Krishan Pahal addressing the gathering during the Constitution Day Event held at IIG.

Karmayogi Saptah

As a part of the Karmayogi Saptah and the National Learning Week, during 21-25 October 2024, IIG organized a webinar titled "Wellness at Work:Yoga and Nutrition for a Healthy Lifestyle" which was attended by all DST institutes.

Activities organised as part of the Karmayogi Saptah at IIG.

IIG STAFF WELFARE AND RECRECATION CLUB

IIG Foundation Day Celebrations: On 1 April 2024, IIG Foundation Day was celebrated with scientific session in the Forenoon. Prof. Shailesh Nayak, Director, NIAS Bengaluru first delivered the Nanabhoy Moos Memorial Lecture. Later on, the Prof. Gobardhan Das, Director, IISER Bhopal delivered a popular science lecture. Under the umbrella of this club, Cultural Programme was organized in the afternoon. Additionally, aligned with Foundation Day Celebrations, both indoor and outdoor games were conducted by this club and IIG employees participated with full enthusiasm in these activities. Prizes were also given to the winners of respective events.

Prof. A.P. Dimri, Director, IIG, welcoming the Guests and presenting a brief overview of the year's activities during IIG Foundation Day at Panvel campus.

Chief Guests Prof. Shailesh Nayak, Director, NIAS Bengaluru; Dr. G. Satheesh Reddy, President, The Aeronautical Society of India; and Prof. Gobardhan Das, Director, IISER Bhopal, being felicitated by Prof. A.P. Dimri, Director, IIG, during the Foundation Day celebrations.

Haldi Kumkum Festival: Club organized Haldi-Kumkum function on 24 January 2025 for the female staff members and students of IIG.

Long Service Awards: IIG conferred Long Service Awards to the following staff members who contributed 25 years and more in IIG.

S.No	Name	Designation
1	Smt. Prachi P Madhavi	Assistant
2	Smt. Nilima T Gavas	Senior Private secretary

Following staff are retired from the service during the period 2024-25. Retirement function has been arranged from IIG Staff Welfare and Recreation club, those who retired in HQ, New Panvel.

Presentation of awards to long-serving staff members of IIG.

Sr. No.	Name of the Employee	Designation	Posted At	No. of years in Service	Retirement Date	Name of the Employee
1	Shri R. S. Kadam	Peon	HQ New Panvel	31 years 08 months 11 days	31.05.2024	Superannunation
2	Shri K. Emperumal	Technical Officer-IV	EGRL, Tirunelveli	32 years 00 months 23 days	31.05.2024	Superannunation
3	Shri K. V. V. Satyanarayana	Technical Officer- IV	Alibag	34 years 4 months 24 days	31.12.2024	Superannunation
4	Shri S. S. Jadhav	Technician -III	HQ New Panvel	32 years 00 months 29 days	28.02.2025	Superannunation
5	Dr. P. B. V. Subba Rao	Professor- F	HQs- New Panvel	33 years 06 months 13 days	28.02.2025	Superannunation
6	Shri J. Kamra	Assistant Director (Official Language)	HQ New Panvel	36 years 05 months 6 days	31.03.2025	Superannunation
7	Smt. Nanda S. Shah	Technician III	HQ New Panvel	37 years 01 month 27 days	30.11.2024	Voluntary Retirement

IN SERVICE OF THE NATION

The Indian Institute of Geomagnetism (IIG), an autonomous research institution under the Department of Science and Technology, Government of India, continues to be at the forefront of national scientific service, addressing critical challenges in Earth and space sciences. With a multi-disciplinary and mission-driven approach, IIG's efforts during the year 2024-25 reflect an unwavering commitment to excellence, innovation, and societal relevance.

Advancing Geomagnetic Infrastructure

At the heart of IIG's operations are its magnetic observatories, spread across diverse geophysical regions of the country. These observatories serve as the backbone of geomagnetic field monitoring. The revival of the Hanle observatory in Ladakh marks a significant milestone, restoring data collection capabilities in one of the most pristine geomagnetic environments of the Indian subcontinent. Coupled with modernization initiatives like the deployment of smart PCs and upgraded digital fluxgate magnetometers (DFMs), the institute ensures uninterrupted, high-fidelity data flow essential for both national infrastructure and global scientific collaborations such as INTERMAGNET.

IIG's commitment to self-reliance and indigenisation was exemplified in its successful development of India's first Overhauser Magnetometer. This high-precision instrument, designed in-house, supports space-weather research and future space missions. It has also been integrated into the PEERS (Probing the Equatorial Electrojet using Rocket Sounding) mission, to be launched aboard a sounding rocket in late 2025, thus bringing IIG's innovation to near-space environments.

Expanding Frontiers in Space and Atmospheric Sciences

IIG's research groups have continued to unravel the complexities of the Earth's upper atmosphere and its coupling with space weather processes. The institute played a key role in deciphering the effects of the 10 May 2024 geomagnetic superstorm, one of the most intense in recent decades, on ionospheric dynamics, cosmic ray variability, and thermal structure of the mesosphere and lower thermosphere (MLT). The studies not only deepen our scientific understanding but also provide actionable knowledge to protect communication, navigation, and satellite-based systems.

The detection of low-latitude auroras from Hanle, a first in Indian observational history, underscores IIG's growing capabilities in polar and space weather research. Investigations on auroral dynamics, Joule heating, atmospheric tides, and magnetospheric coupling have provided critical insights into the Sun-Earth interaction and its cascading effects on the planet's environment.

Through balloon-based missions like BEENS-2 and ground-based instrumentation like Fabry–Perot interferometers and all-sky imagers, IIG has extended its observational footprint. These technologies not only enrich scientific databases but also inspire future research initiatives in atmospheric electricity, ionospheric electrodynamics, and thermospheric wind structures.

National Service through Polar Expeditions

IIG's steadfast role in India's Antarctic missions continues, with its scientists contributing to year-round geomagnetic observations at Bharati and Maitri stations. These datasets are critical for studying long-term changes in the Earth's main magnetic field and understanding outer core processes. Leading such expeditions is a testament to IIG's capability, resilience, and dedication to nation-building even under extreme environmental conditions.

Safeguarding the Solid Earth and Environment

IIG's solid Earth research division has expanded efforts to assess and mitigate geological hazards. In regions like Joshimath, which is grappling with land subsidence, multi-instrumental geophysical investigations have revealed weak zones and fluid pathways, helping in the formulation of scientific strategies for risk reduction and sustainable urban planning.

The seismic and geodynamic research in North-East India, one of the most seismically active regions in the world, remains a strategic priority. Establishment of seismic and GNSS networks, along with the development of 3D velocity models through ambient noise and travel-time tomography, enhances the nation's preparedness for earthquakes and related hazards.

The study of magnetic pollutants in Prayagraj using advanced techniques such as magnetic susceptibility and SEM-EDX analysis highlights IIG's growing contribution to environmental monitoring. These investigations serve as tools for public health assessment and policymaking in urban areas undergoing rapid industrialisation.

Preserving the Past, Forecasting the Future

IIG's palaeomagnetic studies across archaeological sites like Vadnagar and Lothal not only reconstruct the history of the Earth's magnetic field but also contribute to our understanding of past human activities and environmental conditions. By developing India's first paleosecular variation (PSV) curve and integrating data with global models, IIG is building a framework for long-term magnetic field prediction and archaeological dating.

Knowledge Sharing and Outreach

The institute is actively engaged in knowledge dissemination through training, workshops, and capacity building. Events like the MOI workshop at Alibag train technical personnel on calibration, troubleshooting, and administration. Simultaneously, IIG's publications in reputed journals and participation in international conferences reaffirm its scientific leadership.

Outreach activities also reflect IIG's commitment to the scientific temper envisioned in India's constitutional duties. Science awareness campaigns, student mentorship, and collaborative initiatives aim to inspire the next generation of researchers and foster a scientifically informed citizenry.

A Trusted Partner in National Development

Whether it's contributing to the understanding of the Indian summer monsoon using machine learning, modelling space plasma processes in Earth and planetary environments, or supporting India's planetary exploration initiatives, IIG continues to act as a vital pillar in the nation's scientific and strategic infrastructure.

In every endeavour, from operating observatories in the remote Himalayas and polar regions to pushing the boundaries of theoretical space plasma physics, Indian Institute of Geomagnetism exemplifies the motto of being truly "In Service of the Nation."

CORPORATE SOCIAL RESPONSIBILITIES

CITIZEN CHARTER

Under Right to Information Act 2005, Indian Institute of Geomagnetism, being a Public Authority, receives RTI application from citizens (see https://iigm.res.in/citizens-charter/right-information). Name, address and contact of CPIO and FAA are as under as:

Central Public Information Officer (CPIO)
Dr. Navin Parihar (Professor-E)
Indian Institute of Geomagnetism
Plot No. 5, Sector-18, New Panvel (W),
Navi Mumbai-410218, Maharashtra
Tel.:022- 2748 4022
Fax: 022-2748 0762
E-mail: navin[dot]parihar[at]iigm[dot]res[dot]in

Appellate Authority
Prof. Satyavir Singh (Professor-G)
Indian Institute of Geomagnetism
Plot No. 5, Sector-18
New Panvel (W),
Navi Mumbai-410218
Maharashtra
Tel.:022-2748 4149
Fax: 022-2748 0762
E-mail: satyavir[dot]s[at]iigm[dot]res[dot]in

RTI applications are properly addressed well within the deadline.

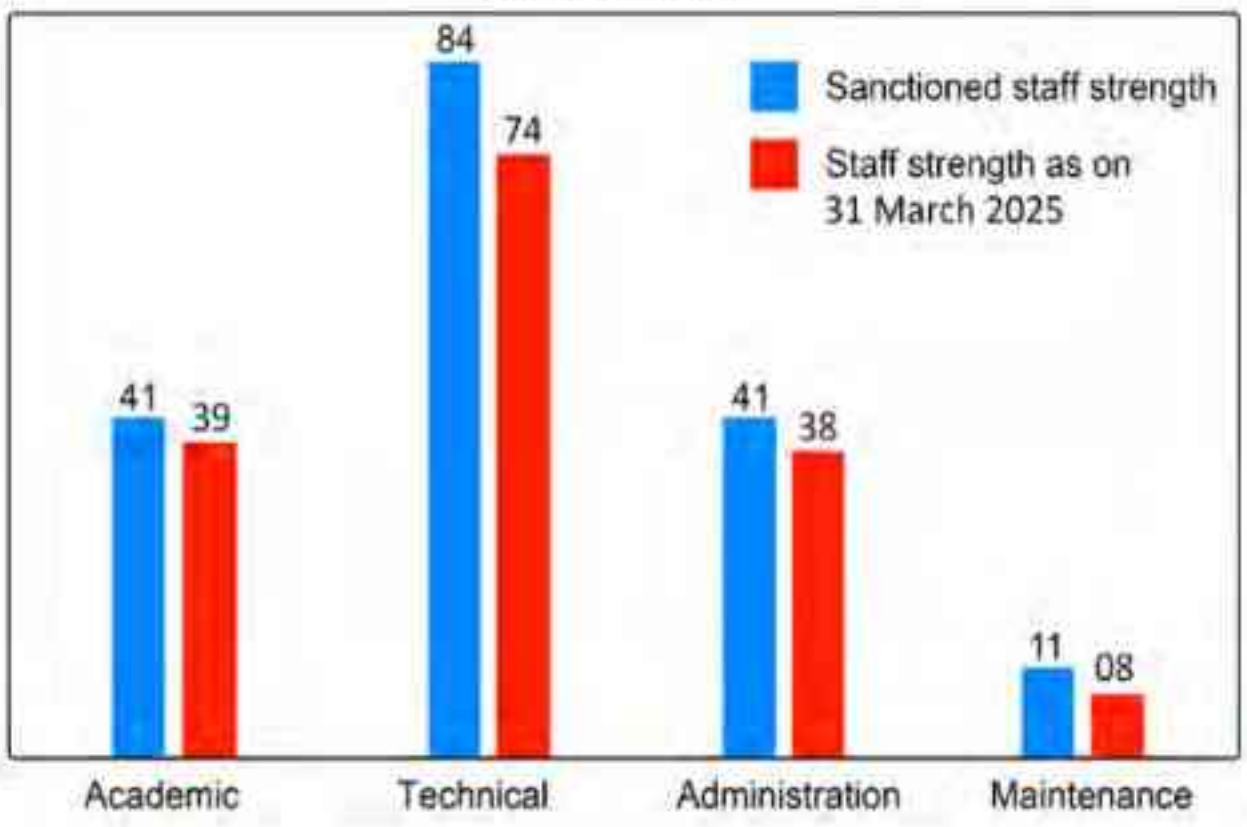
The status of RTI applications/appeals received by IIG, during 2024-2025

Nature of RTI Applications	Applications Received	Request Disposed Off
Applications	54	54
First Appeals	19	19

RESERVATION POLICY

The Institute has been implementing the reservation policy of the Govt. of India from time to time.

STAFF PROFILE



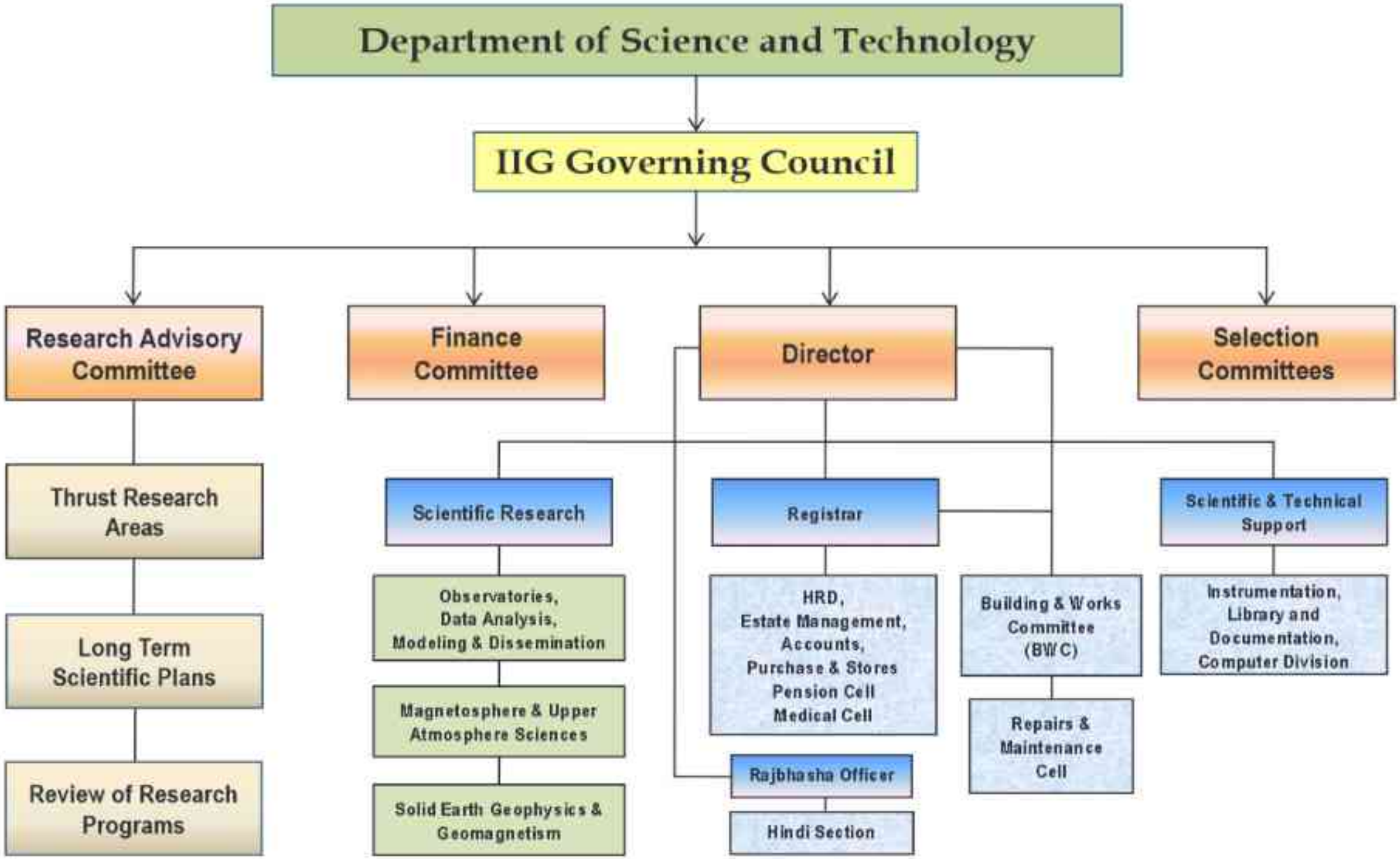
ACTION TAKEN NOTE ON AUDITORS REPORT

No serious adverse comments have been received. However, All remedial measures have been taken.

MOBILIZATION OF RESOURCES

The Institute has been constantly making endeavors to mobilize resources by extending its scientific and technical expertise to other organizations.

Organizational chart of the Institute



Audit Report

2024-2025

Jain Gangwal & Associates
Chartered Accountants

INDEPENDENT AUDITOR'S REPORT

To,
The Governing Council,
Indian Institute of Geomagnetism,
Autonomous body formed by Department of Science & Technology, Government of India
(Trust Registration No. AF/2375, Society Registration No. Bom 91/71 GBBSD)
Panvel, Navi Mumbai

Opinion

We have audited the financial statements of Indian Institute of Geomagnetism (hereinafter referred to as 'the Institute') (the entity), which comprise the balance sheet as at March 31, 2025, and the Income and Expenditure Account for the year then ended, and notes to the financial statements, including a summary of significant accounting policies and other explanatory Information (hereinafter referred to as 'the Financial Statements').

Basis for Opinion

We conducted our audit in accordance with the Standards on Auditing (SAs) issued by ICAI. Our responsibilities under those Standards are further described in the Auditor's Responsibilities for the Audit of the Financial Statements section of our report. We are independent of the entity in accordance with the Code of Ethics issued by ICAI and we have fulfilled our other ethical responsibilities in accordance with the Code of Ethics. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Emphasis of matters

We draw attention to:

i) Note no. 17 under notes to accounts relating during FY 2024-25, the Institute's accounting data server was affected by a **ransomware incident on 19th July 2025**, resulting in the loss of stored financial data. The incident was promptly reported to **CERT-In and the Department of Science & Technology (DST)**. In the process of re writing books of accounts for FY 2024-25 in group of ledgers of particular group opening balance of such group is matched with audited financial statement of FY 2023-24 but itemized balances were not available particularly with group like sundry creditors and sundry debtors. To ensure completeness and accuracy, the Institute engaged a professional external agency to re-enter the accounting data from original supporting documents, vouchers, and records.

103, VTM 2 Building, Mehra Compound, Andheri Kurla Road, Sakinaka, Andheri (E), Mumbai - 400072
Tel.: 022 40152527, 28511935 / 28592526 • Email: info@jaingangwal.com • Web: www.jaingangwal.com

ii) Note No. 10 under notes to accounts relating to non-provision of Gratuity Liability, Leave Encashment and Commuted Pension liability for continuing employees (as fully explained in detail in the Notes);

Our opinion is not modified in respect of this above both the matters

Responsibilities of Management and Those Charged with Governance for the Financial Statements

Management is responsible for the preparation of the financial statements in accordance with applicable laws and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error. In preparing the financial statements, management is responsible for assessing the entity's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the entity or to cease operations, or has no realistic alternative but to do so. Those charged with governance are responsible for overseeing the entity's financial reporting process.

Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with SAs will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with SAs, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events

JAIN GANGWAL & ASSOCIATES * CHARTERED ACCOUNTANTS * MUMBAI FRN : 114382W

or conditions that may cast significant doubt on the entity's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the entity to cease to continue as a going concern.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

We also provide those charged with governance with a statement that we have complied with relevant ethical requirements regarding independence, and to communicate with them all relationships and other matters that may reasonably be thought to bear on our independence, and where applicable, related safeguards.

For JAIN GANGWAL & Associates
Chartered Accountants
FRN – 0114382W

CA NM Jain
Partner M.NO. – 041613

Place: Mumbai

Dated: 28th September , 2025

UDIN: 25041613BM12DX6511

INDIAN INSTITUTE OF GEOMAGNETISM, MUMBAI
Autonomous body formed by Department of Science & Technology, Government of India
(Trust Registration No. AF/2375, Society Registration No. Bom 91/71 GBBSD)

SIGNIFICANT ACCOUNTING POLICIES AND NOTES TO ACCOUNTS

Indian Institute of Geomagnetism is an autonomous body under the Department of Science and Technology (DST), Government of India. The Institute's main activity is scientific research in the field of Geomagnetism.

A: SIGNIFICANT ACCOUNTING POLICIES:

1) ACCOUNTING CONVENTION:

a) The Financial Statements are prepared under the historical cost convention on the basis of going concern and in accordance with the applicable Accounting Standards issued by The Institute of Chartered Accountants of India (ICAI) except AS-11 relating to Accounting for the Effects of Changes in Foreign Exchange Rates' and AS 15 relating to 'Employee Benefits'

b) The Institute generally follows the mixed system of accounting. It recognizes Government grants and those with significant uncertainties on cash basis and other income and expenditure on accrual basis. Expenditure is recognized based on grant amount available to be utilized during the financial year.

2) FIXED ASSETS:

Fixed Assets are stated at their original cost of acquisition / installation. Fixed assets are shown net of accumulated depreciation without any adjustment of foreign exchange fluctuation gain/ (loss) and capital grant received against the specific asset. Subsequent expenditure related to an item of fixed asset is added to its book value only if it increases the future benefits from existing asset beyond is previously assessed standard of performance. All other expenses on existing fixed assets including day-to-day repairs and maintenance expenditure and cost of replacing parts are charged to the Income and Expenditure Account for the period to which such expenses are incurred.
Losses arising from the retirement of, and gains or losses arising from disposal of fixed assets which are carried at cost are recognized in the Income and Expenditure Account.

3) DEPRECIATION

a) Depreciation is provided on pro-rata basis on Written Down Value method corresponding to the rates prescribed under Section 32 of Income Tax Act, 1961 as tabulated hereunder:

Block of asset	Rate of depreciation
Land and Building	5%
Furniture and Fixtures	10%
Office Equipment	15%
Motor Vehicle	15%
Computer and software	40%
Laboratory Equipment	15%
Books	40%
Electrical installation	15%

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b) Assets costing Rs.5000/- or less each is fully expensed out in the year of acquisition.
c) Leasehold land is amortized over the period of lease.

4) CAPITAL WORK IN PROGRESS

Capital Work-in-progress is stated at the amount spent up to the date and advances made to respective parties if backed by asset. If the expenditure is not backed by asset, the same is recorded as Pre-operative Expenses (Project) under the head Miscellaneous Expenditure.

5) GOVERNMENT GRANT

Government grants are accounted on Receipt basis. The Institute receives funds from Department of Science and Technology (DST) under three heads:
a) Grant-in-aid-Salary
b) Grant-in-aid-General and
c) Grant-in-aid-Capital

Grant-in-aid-Salary and Grant-in-aid-General are accounted in Income & Expenditure statement of the Institute. Grant-in-aid-capital plan is accounted in the Balance Sheet under the head "Capital Fund".

6) OTHER INCOME

Subscriptions – Medical subscriptions collected from certain employees towards medical benefits on their retirement is recognized as income on receipt basis in the year of collection.

Interest - Interest income is recognized on a time proportion basis taking into account the amount outstanding and the applicable interest rate on fixed deposits placed with banks.

Other Income – This comprises of income from project work, income from hostel/guest house receipts and miscellaneous income. This income is recognized on receipt basis.

7) INVENTORIES

Closing Stock is valued at cost or market price whichever is less on First in First out Method (FIFO) basis and certified by the management of the Institute as to quantity and method of valuation. Items included in inventory are spares and other stationery material.

8) RETIREMENT BENEFITS:

Contribution towards provident fund for all employees is made to a separate fund account that is managed separately by the organization. Such benefits are classified as defined contribution schemes as the organization does not carry any further obligation, apart from the contributions made on a monthly basis.

Gratuity, Leave Encashment and Commuted Pension Liability are provided for those employees who are going to retire in the next financial year. No provision is made for continuing employees. No separate fund is created for the above and Accounting Standard 15 (AS-15) is not followed.

9) CONTINGENT LIABILITIES & PROVISIONS:

JAIN GANGWAL & ASSOCIATES MUMBAI FRN : 114382W CHARTERED ACCOUNTANTS

No provision is made for liabilities, which are contingent in nature, but, if material, the same are disclosed by way of notes to the accounts and accounted on payment basis.

10) GENERAL:

Accounting policies not specifically referred to above are consistently followed. Any deviation from the existing policy is disclosed in the Notes to Accounts.

B. NOTES TO ACCOUNTS:

1. As per notification no. BPI 1390/317/ (75)-6 dated 5th March 1991 issued by the Government of Maharashtra; this Institute has been exempted from all provisions of the Bombay Public Trust Act, 1950, except those relating to registration contained in Chapter IV of the said Act.

2. Contingent Liabilities –

Nature of Liability	Amount in Rupees
**Traces demand	1,94,010

**Institute has applied for rectification to Income Tax Department and the same is pending for rectification.

3. Contingent Advances –

   Contingent Advances balance as on 31st March, 2025 is Rs.10,54,061.00

4. The management has carried out physical verification of inventory (consisting mainly of Stores and Spares) as at year end. As per the management there are no discrepancies noticed during the physical verification.

5. The management has carried out physical verification of closing stock as at year end.

6. Physical Verification & reconciliation of fixed assets with book was carried out by management during the year

7. Capital work in progress as on 31stMarch, 2025 is verified and certified by management / respective authorities.

8. Title to Property:
   Properties worth Rs.1,13,18,789/- (movable Rs. 8,83,800/- and immovable Rs.104,34,989/-) previously belonging to India Meteorological Department (IMD), another Government department and in occupation of the Institute have not been accounted for in the Balance Sheet as the same have not yet been conveyed to the Institute by the Government of India. The Institute continues use and incur expenses towards maintenance of this premise.

9) In General, Provident Fund (GPF) no. of employees as at 31st March 2025 is 43. Contributions of GPF deducted from employees' salaries have been remitted to a special account called "IIG GPF Account" respectively in Bank of India, Panvel Branch. The above doesn't form part of the Institutes books of account.

JAIN SANGWAL & ASSOCIATES * CHARTERED ACCOUNTANTS * MUMBAI FRN : 114352W

b) NPS Scheme

The employees joined on or after 01.04.2004 are eligible for "National Pension Scheme". The Institute has remitted the respective contributions (both employee and employer) to "NPS Trust Account" with Axis Bank. The above doesn't form part of the Institutes books of account.

10. Gratuity Liability, Leave Encashment and Commuted Pension have been provided as at 31st March, 2025 for those employees who are going to retire in the next financial year. Amount provided for as at 31st March,2025 is Rs.5,27,50,745/- (Previous year: Rs. 2,17,17,009/-). No provision has been made for Gratuity, Leave Encashment and Commuted Pension payable on retirement of continuing employees. The Liability for above is not estimated for continuing employees. Total liability accruing for continuing employees as at 31stMarch, 2025 is not determined and provided. The unfunded obligation will be made good by the Ministry on request of the Institute.

11. **Government Grants to the Institute**

The Institute has received the following grants during the year:

Particulars	Current Year			Previous Year	
	Grant received	Unspent Grant lapsed to Govt. Account	Actual grant received As per Income & Exp. Account/Capital Fund	As per Income & Exp. Account/Capital Fund	Actual grant received
Grant-in-aid-Salary	426300000	7137790	419162210	384000000	384000000
Grant-in-aid-General	145000000	77070	144922930	134000000	134000000
Grant-in-aid-Capital	47000000	212606	46787394	28400000	28400000
Grant-in-aid- Repair and Maintenance under Infrastructure	49900000	0	49900000	0	0

12.Loans and advances to employees and others outstanding as at 31st March, 2025 is Rs.34,87,210 (Previous Year Rs. 72,75,529 /-). Adjustment will be made as and when the approvals are communicated to the accounts department.

JAIN GANGWAL & ASSOCIATES * CHARTERED ACCOUNTANTS * MUMBAI FRN: 114382W

14. Except for expenditure in foreign currency for travel purposes and Equipment's import, there are no other foreign currency transactions. Hence, AS-11 is not adhered by the Institute.

15. IIG Pension fund balance as at 31st March, 2025 Rs.8,64,95,502/- (Previous year Rs. 8,01,65,071/-) consisted assets side Fixed Deposits Rs. 8,63,54,015/- (Previous year Rs. 7,04,06,373/-), Bank of India Bank balance Rs.1,41,487 /- (Previous year Rs. 97,58,698 /-) and Liability side represents Earmarked/Endowment Funds (Pension) Rs. 8,64,95,502/-. These are taken in respective heads in IIG Main Financial Statements.

16. Interest income amounting to Rs.1,64,964/- earned on SDR during the year ended March 31,2025 needs to be refunded back to the Ministry as per the sanction order. This transfer entry has been accordingly reduced from interest income. The amount payable to Ministry is currently classified under other current liabilities.

17. **Data Security Incident and Data Re-Entry**

During FY 2024-25, the Institute's accounting data server was affected by a **ransomware incident on 19th July 2025**, resulting in the loss of stored financial data. The incident was promptly reported to **CERT-In** and the **Department of Science & Technology (DST)**.

In the process of re writing books of accounts for FY 2024-25 n group of ledgers of particular group opening balance of such group is matched with audited financial statement of FY 2023-24 but itemized balance were not available particularly with group sundry creditors and sundry debtors.

To ensure completeness and accuracy, the Institute engaged a professional external agency to re-enter the accounting data from original supporting documents, vouchers, and records.

We confirm that:

- The re-entered data has been thoroughly reviewed and reconciled by the Institute's internal team.
- All transactions have been properly recorded and reflected in the financial statements.
- There are no material discrepancies arising from the re-entry process, and the books of account present a true and fair view of the Institute's financial position.

18. Details of Statutory Liability are as under

Particular	FY	Disputed liability	Un disputed Liability
GST *	2017-18	55,57,862/-	
GST TDS	2023-24		5,02,485/-
GST TDS	2024-25		23488/-
GST	2024-25		27668/-

JAIN GANGWAL & ASSOCIATES • CHARTERED ACCOUNTANTS • MUMBAI

19. Profit / loss on Sale of Assets amounting to Rs 2,77,889/- comprises of the followings

Particular	Amount in Rs
Profit on sale of Movable Assets	Rs 3,09,092/-

Loss on sale of Movable Assets	Rs 31,203/-
Net Amount	Rs 2,77,889/-

20. Previous year's figures have been regrouped/reclassified wherever necessary.

As per our Report of even dated.

For JAIN GANGWAL & Associates
Chartered Accountants
FRN – 0114382w

CA NM Jain
Partner
M.NO. – 041613

For INDIAN INSTITUTE OF GEOMAGNETISM

IN-CHARGE ACCOUNTS **THE DIRECTOR FOR TRUSTEE**

Place: Mumbai
Dated: 28th September , 2025
UDIN: 25041613BM120X6517

वित्तीय विवरण प्रपत्र (गैर-लाभकारी संगठन)
FORM OF FINANCIAL STATEMENTS (NON – PROFIT ORGANISATIONS)
संस्थान का नाम : भारतीय भूचुम्बकत्व संस्थान, न्यू पनवेल, नवी मुंबई - 410 218
Name of Entity : Indian Institute of Geomagnetism, New Panvel, Navi Mumbai – 410 218.

31 मार्च 2025 तक का तुलन पत्र / BALANCE SHEET AS AT 31ST MARCH 2025

(राशि / Amount – ₹ /Rs.)

पूंजिगत निधि एवं देयताएं / CAPITAL FUND AND LIABILITIES	अनुसूची Schedule	वर्तमान वर्ष / Current Year as on 31/03/2025 के अनुसार	पिछला वर्ष / Previous Year as on 31/03/2024 के अनुसार
पूंजिगत निधि / CAPITAL FUND	1	69,76,35,304	69,44,70,113
आरक्षित एवं अधिशेष / RESERVES AND SURPLUS	2	-	-
विशिष्ट प्रयोजनों / EARMARKED FUNDS	3	8,63,54,015	8,01,65,071
सुरक्षित ऋण एवं उधारी / SECURED LOANS AND BORROWINGS	4	-	-
असुरक्षित ऋण एवं उधारी / UNSECURED LOANS AND BORROWINGS	5	-	-
आस्थगित उधार देयताऐं / DEFERRED CREDIT LIABILITIES	6	-	-
वर्तमान देयताऐं एवं प्रावधान / CURRENT LIABILITIES AND PROVISIONS	7	5,80,45,836	3,79,93,460
कुल / TOTAL		**84,20,35,155**	**81,26,28,644**
परिसम्पत्ति / ASSETS			
अचल परिसम्पत्ति / FIXED ASSETS	8	65,56,10,376	60,20,72,424
निवेश - विशिष्ट प्रयोजनों की निधियों से प्राप्त INVESTMENTS – FROM EARMARKED FUNDS	9	8,65,74,392	7,04,06,373
निवेश - अन्य / INVESTMENTS – OTHERS	10	2,750	2,750
वर्तमान परिसम्पत्ति, ऋण, अग्रिम इत्यादि CURRENT ASSETS, LOANS, ADVANCES ETC.	11	9,96,47,637	14,01,47,097
विविध व्यय (बट्टे खाते में डालने या समायोजित नहीं होने के स्तर तक) MISCELLANEOUS EXPENDITURE (TO THE EXTENT NOT WRITTEN OFF OR ADJUSTED)			
कुल / TOTAL		**84,20,35,155**	**81,26,28,644**

खातों के साथ जुड़ी टिप्पणियां देखें - अनुसूची 24

समान तारीख की हमारी रिपोर्ट के अनुसार / As per our Report of even dated

कृते जैन गंगवाल एन्ड एसोसिएट्स
For JAIN GANGWAL & ASSOCIATES
चार्टर्ड अकाउंटेंट / Chartered Accountants
फर्म सं./Firm No. 0114382W

JAIN GANGWAL & ASSOCIATES * CHARTERED ACCOUNTANTS * MUMBAI FRN : 114382W

एन एम जैन / NM JAIN
सदस्यता क्र/Membership No. : 041613
भागीदार / Partner

स्थान / Place : मुंबई / Mumbai
दिनांक / Dated : 28.09.2025
UDIN 25041613BMI20X6517

मेरी जानकारी तथा विचार से, उपर्युक्त तुलन पत्र ट्रस्ट की निधियों एवं देयदाताओं तथा सम्पत्ति का सही एवं उचित लेखा-जोखा प्रस्तुत करता है । The above Balance Sheet to the best of my knowledge and belief contains a true and fair account of the funds and liabilities and property assets of the Trust.

कृते भारतीय भूचुम्बकत्व संस्थान
For INDIAN INSTITUTE OF GEOMAGNETISM

K.P.Salvi

लेखा प्रभारी
IN CHARGE ACCOUNTS

निदेशक, कृते न्यासी
THE DIRECTOR FOR TRUSTEE

वित्तीय विवरण प्रपत्र (गैर-लाभकारी संगठन)
FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
संस्थान का नाम : भारतीय भूचुम्बकत्व संस्थान, न्यू पनवेल, नवी मुंबई - 410 218
Name Of Entity : Indian Institute Of Geomagnetism, New Panvel, Navi Mumbai – 410 218.

31 मार्च 2025 तक का आय तथा व्यय खाता
INCOME AND EXPENDITURE ACCOUNT FOR THE PERIOD / YEAR ENDED 31ST MARCH 2025

(राशि / Amount – रू./Rs.)

आय / INCOME	अनुसूची Schedule	वर्तमान वर्ष / Current Year as on 31/03/2025 के अनुसार	पिछला वर्ष / Previous Year as on 31/03/2024 के अनुसार
बिक्री / सेवाओं से आय / Income from Sales / Services	12	618000	180000
वृत्ति / अनुदान / Grants / Subsidies	13	56,40,85,140	51,79,98,922
शुल्क / अभिदान / Fees / Subscriptions	14	6,49,376	6,48,033
निवेश से आय (निधियों में अंतरित / विशिष्ट प्रयोजनों / अक्षय निधियों से निवेश पर आय।) Income from Investments (Income on Invest. from earmarked/endow. Funds transferred to Funds)	15	-	-
अधिशुल्क, प्रकाशन इत्यादि से आय / Income from Royalty, Publication etc.	16	-	-
ब्याज अर्जित / Interest Earned	17	1,56,56,094	1,26,29,582
परिसम्पत्ति की बिक्री होने पर अन्य आय / Profit on sale of assets	18		2,66,506
मुनाफे / Other Income	18(a)	30,32,690	56,47,962
तैयार वस्तुओं एवं जारी कार्य के भंडार में वृद्धि / कमी Increase / (decrease) in stock of Finished goods and works-in-progress	19	-	-
कुल / TOTAL (A)		**58,40,41,299**	**53,73,71,005**

JAIN GANGWAL & ASSOCIATES * CHARTERED ACCOUNTANTS * FRN - 114362W

Cont... II

(राशि / Amount – रू./Rs.)

व्यय / EXPENDITURE	अनुसूची Schedule	वर्तमान वर्ष / Current Year as on 31/03/2025 के अनुसार	पिछला वर्ष / Previous Year as on 31/03/2024 के अनुसार
स्थापना खर्च / Establishment Expenses	20	44,68,75,193	35,79,15,603
अन्य प्रशासनिक खर्च इत्यादि / Other Administrative Expenses etc.	21	14,96,63,591	14,02,88,864
वृत्ति, अनुदान इत्यादि पर खर्च / Expenditure on Grants, Subsidies etc.	22	5,70,000	4,00,000
ब्याज / Interest	23	-	-
परिसम्पत्ति की बिक्री होने पर घाटा / Loss on sale of Asset		2,77,889	-
अवमूल्यन / Depreciation	8	6,48,77,829	6,15,17,913
कुल / TOTAL (B)		**66,22,64,502**	**56,01,22,380**
व्यय से अधिक आय की शेष राशि (A-B) **Balance being excess of Income over Expenditure (A-B)**		**(7,82,23,202)**	**(2,27,51,375)**
विशेष आरक्षित में स्थानांतरण (प्रत्येक बताऐ) / Transfer to Special Reserve (Specify each)			
आय तथा व्यय खाते में / से स्थानांतरण / Transfer to / from Income and Expenditure A/c			0
समग्र / पूंजिगत निधि में लिए गए घाटे की शेषराशि **Balance being deficit carried to Corpus / Capital Fund**		**(7,82,23,202)**	**(2,27,51,375)**

खातों के साथ जुड़ी टिप्पणियां देखें - अनुसूची 24
See accompanying Notes to Accounts - Schedule 24
समान तारीख की हमारी रिपोर्ट के अनुसार / As per our Report of even dated.

कृते जैन गंगवाल एन्ड एसोसिएट्स
For JAIN GANGWAL & ASSOCIATES
चार्टर्ड अकाउंटेंट / Chartered Accountants
फर्म सं./Firm No. 0114382W

एन एम जैन / NM JAIN
सदस्यता क्र/Membership No. : 041613
भागीदार / Partner

स्थान / Place : मुंबई / Mumbai
दिनांक / Dated : 28.09.2025
UDIN - 25041613BMI2DX6517

मेरी जानकारी तथा विचार से, उपर्युक्त आय तथा व्यय खाता ट्रस्ट के आय एवं व्यय का सही एवं उचित लेखा-जोखा प्रस्तुत करता हैं। The above Income and Expenditure A/c to the best of my knowledge and belief contains a true and fair account of the Income and Expenditure of the Trust.

कृते भारतीय भूचुम्बकत्व संस्थान
For INDIAN INSTITUTE OF GEOMAGNETISM

K.R.Sahi

लेखा प्रभारी
IN CHARGE ACCOUNTS

निदेशक, कृते न्यासी
THE DIRECTOR FOR TRUSTEE

वित्तीय विवरण प्रपत्र (गैर-लाभकारी संगठन)

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)

संस्थान का नाम : भारतीय भूचुम्बकत्व संस्थान, न्यू पनवेल, नवी मुंबई - **410 218**

Name Of Entity : Indian Institute Of Geomagnetism, New Panvel, Navi Mumbai – 410 218.

31 मार्च 2025 तक तुलन पत्र के विभिन्न अनुसूची के भाग

SCHEDULE FORMING PART OF BALANCE SHEET AS AT 31ST MARCH 2025

(राशि / Amount – रू. / Rs.)

अनुसूची 1 / SCHEDULE 1 : पूंजिगत निधि / CAPITAL FUND		वर्तमान वर्ष / Current Year as on 31/03/2025 के अनुसार	पिछला वर्ष /Previous Year as on 31/03/2024 के अनुसार
वर्ष के आरंभ में शेष राशि / Balance as at the beginning of the year		69,44,70,113	68,88,53,480
जोडे : Add :	पूंजिगत निधि हेतु अंशदान Contributions towards capital Fund	9,66,87,394	2,83,68,009
जोडे : Less :	आय तथा व्यय खाता से स्थानांतरित निवल आय की शेषराशि Balance of net income transferred from the Income and Expenditure Account	(7,82,23,202)	(2,27,51,375)
जोडे : Less :	Previous balance of unspent Capital Fund refunded to CFI	(1,52,99,000)	
वर्ष के अंत में शेषराशि / BALANCE AS AT THE END OF THE YEAR		**69,76,35,304**	**69,44,70,113**

JAIN GANGWAL & ASSOCIATES * CHARTERED ACCOUNTANTS *

K.R. Salvi

वित्तीय विवरण प्रपत्र (गैर-लाभकारी संगठन)
FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
संस्थान का नाम : भारतीय भूचुम्बकत्व संस्थान, न्यू पनवेल, नवी मुंबई - 410 218
Name Of Entity : Indian Institute Of Geomagnetism, New Panvel, Navi Mumbai – 410 218.
SCHEDULE FORMING PART OF BALANCE SHEET AS AT 31ST MARCH 2025
(राशि / Amount – रू. / Rs.)

अनुसूची 2 : आरक्षित एवं अधिशेष / SCHEDULE 2 : RESERVES AND SURPLUS	वर्तमान वर्ष / Current Year as on 31/03/2025 के अनुसार	पिछला वर्ष / Previous Year as on 31/03/2024 के अनुसार
	NIL	NIL
कुल / TOTAL	NIL	NIL

अनुसूची 3 : विशिष्ट प्रयोजना / अक्षय निधियाँ SCHEDULE 3 : EARMARKED/ENDOWMENT FUNDS	वर्तमान वर्ष / Current Year as on 31/03/2025 के अनुसार	पिछला वर्ष / Previous Year as on 31/03/2024 के अनुसार
IIG PENSION FUND	8,63,54,016	8,01,65,071
कुल / TOTAL	8,63,54,016	8,01,65,071

अनुसूची 4 : सुरक्षित ऋण एवं उधारी SCHEDULE 4 : SECURED LOANS AND BORROWINGS	वर्तमान वर्ष / Current Year as on 31/03/2025 के अनुसार	पिछला वर्ष / Previous Year as on 31/03/2024 के अनुसार
	NIL	NIL
कुल / TOTAL	NIL	NIL

अनुसूची 5 : असुरक्षित ऋण एवं उधारी SCHEDULE 5 : UNSECURED LOANS AND BORROWINGS	वर्तमान वर्ष / Current Year as on 31/03/2025 के अनुसार	पिछला वर्ष / Previous Year as on 31/03/2024 के अनुसार
	NIL	NIL
कुल / TOTAL	NIL	NIL

अनुसूची 6 : आस्थगित उधार देयताएं / SCHEDULE 6 : DEFERRED CREDIT LIABILITIES	वर्तमान वर्ष / Current Year as on 31/03/2025 के अनुसार	पिछला वर्ष / Previous Year as on 31/03/2024 के अनुसार
	NIL	NIL
कुल / TOTAL	NIL	NIL

JAIN GANGWAL & ASSOCIATES * CHARTERED ACCOUNTANTS * MUMBAI FRN : 114382W

K.R.Bali

वित्तीय विवरण प्रपत्र (गैर-लाभकारी संगठन)
FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
संस्थान का नाम : भारतीय भूचुम्बकत्व संस्थान, न्यू पनवेल, नवी मुंबई - 410 218
Name Of Entity : Indian Institute Of Geomagnetism, New Panvel, Navi Mumbai – 410 218.

31 मार्च 2025 तक तुलन पत्र के विभिन्न अनुसूची के भाग

SCHEDULE FORMING PART OF BALANCE SHEET AS AT 31ST MARCH 2025

(राशि / Amount – रू. / Rs.)

अनुसूची 7 - वर्तमान देयताएं एवं प्रावधान SCHEDULE 7 – CURRENT LIABILITIES AND PROVISIONS			वर्तमान वर्ष / Current Year as on 31/03/2025 के अनुसार	पिछला वर्ष /Previous Year as on 31/03/2024 के अनुसार
A. वर्तमान देयताएं / CURRENT LIABILITIES				
1	स्वीकृत बिल / Acceptances		-	-
2	विविध लेनदार / Sundry Creditors:			
	a)	सामग्री हेतु / For Goods	-	-
	b)	अन्य / Others	1,57,062	1,57,062
3	प्रतिभूति जमा देय / Security Deposit Payable		19,40,504	19,74,722
4	उपार्जित किन्तु अप्राप्य ब्याज / Interest accrued but not due on:			
	a)	सुरक्षित ऋण/उधारी / Secured Loans/borrowings	-	-
	b)	असुरक्षित ऋण/उधारी / Unsecured Loans/borrowings	-	-
5	संवैधानिक देयताएं / Statutory Liabilities:			
	a)	अतिदेय / Overdue	-	-
	b)	अन्य / Others	7,07,555	11,73,863
6	अन्य वर्तमान देयताएं / Other current Liabilities		17,88,570	1,22,44,404
	प्रतिधारण राशि / Retention money		-	-
कुल / TOTAL (A)			45,93,691	**1,55,50,051**
B. प्रावधान /PROVISIONS				
1	जीपीएफ ब्याज पर घाटा / Loss on interest for GPF		-	-
2	आनुतोषिक / Gratuity		1,84,49,801	59,73,050
3	पेंशन का रूपान्तरण / Commutation of Pension		1,88,71,111	92,32,999
4	संचित छुट्टी नकदीकरण / Accumulated Leave Encashment		1,54,29,833	65,10,960
5	प्रयोगशाला उपकरण के लिए प्रावधान Provision for Lab Equipment		6,03,900	6,03,900
6	Audit & Professional Fees payable		97,500	1,22,500
7	अन्य वर्तमान देयताएं (दूरभाष, विद्युत, पानी शुल्क इत्यादि पर हुए खर्च) Others current Liabilities (for expenses on telephone, electricity, water charges etc.)		-	-
कुल / TOTAL (B)			5,34,52,145	**2,24,43,409**
कुल / TOTAL (A + B)			5,80,45,836	**3,79,93,460**

वित्तीय विवरण प्रपत्र (गैर-लाभकारी संगठन)
FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
संस्थान का नाम : भारतीय भूचुम्बकत्व संस्थान, न्यू पनवेल, नवी मुंबई - 410 218
Name Of Entity : Indian Institute Of Geomagnetism, New Panvel, Navi Mumbai – 410 218.
31 मार्च 2025 तक तुलन पत्र के विभिन्न अनुसूची के भाग
SCHEDULE FORMING PART OF BALANCE SHEET AS AT 31ST MARCH 2025

(राशि / Amount – ₹. / Rs.)

अनुसूची /SCHEDULE 8 : अचल परिसम्पत्ति / FIXED ASSETS		सकल खंड /GROSS BLOCK				अवमूल्यन / DEPRECIATION					निवल खंड / NET BLOCK	
	DESCRIPTION	वर्ष के आरंभ में लागत / मूल्य / Cost / valuation as at beginning of the year 01/04/2024	वर्ष के दौरान परिवर्धन Additions during the year	वर्ष के दौरान कटौती Deductions during the year	वर्ष के अंत में लागत / मूल्य / Cost / valuation at the year-end 31/03/2025	वर्ष के आरंभ में संचित / मूल्यह्रास /As at the beginning of the year 01/04/2024	वर्ष के दौरान परिवर्धन / On additions during the year	वर्ष 2024-25 हेतु / For the year 2024-25	वर्ष के दौरान कटौती पर / On deductions during the year	वर्ष के अंत तक - कुल / Total up to the year – end 31/03/2025	वर्तमान वर्ष के अंत दर्शाए / As at the current year-end 31/03/2025	पिछले वर्ष के अंत दर्शाए /As at the previous year-end 31/03/2024
A.	अचल परिसम्पत्ति / FIXED ASSETS											
1	भूमि / LAND :											
	a) फ्रीहोल्ड / Freehold	34,93,366	-	-	34,93,366	-	-	-	-	-	34,93,366	34,93,366
	b) पट्टे की भूमि / Leasehold	8,64,66,353	-	-	8,64,66,353	2,25,10,538	-	-	-	2,25,10,538	6,39,55,815	6,39,55,815
2	भवन-परिसर / BUILDINGS											
	a) पूर्ण स्वामित्व भूमि पर On Freehold Land	29,89,06,329	2,19,60,640	-	32,08,66,969	14,96,51,729	10,98,032	74,64,930	-	15,82,14,691	16,26,84,678	14,92,86,600
	b) पट्टे की भूमि पर / On Leasehold Land	26,03,27,476	-	-	26,03,27,476	13,80,36,739	-	61,14,886	-	14,41,44,614	11,61,82,862	12,22,97,750
	c) स्वामित्व अनाधारित / Ownership Flats/Premises	-	-	-	-	-	-	-	-	-	-	-
	d) भूमि पर अधिरचना इकाई के सम्बंधित नहीं है/Superstructures on Land not belonging to the entity	-	-	-	-	-	-	-	-	-	-	-
3	प्रयोगशाला उपकरण / LABORATORY EQUIPMENT	68,49,33,938	3,95,76,156.00	4,79,156	70,41,39,938	51,37,98,299	87,32,806	2,17,71,552	-	54,53,00,857	15,88,39,280	14,51,43,679
4	मोटर गाड़ी वाहन / MOTOR CAR VEHICLE	77,87,221		13,712	77,73,509	57,69,187		3,01,847	-	60,63,044	17,10,465	20,26,024
5	फर्नीचर, फिक्सचर्स / FURNITURE, FIXTURES	3,53,66,306	22,66,475		3,76,51,775	2,49,33,695	1,50,113	10,44,582	-	2,61,34,355	1,15,17,420	1,04,46,620
6	कार्यालय उपकरण / OFFICE EQUIPMENT	6,77,72,247	31,67,702	26,584	7,09,13,365	3,69,92,025	3,76,914	47,67,034	-	4,11,35,973	2,97,77,397	3,17,80,227
7	कंप्यूटर / सॉफ्टवेयर / COMPUTER & SOFTWARE	24,24,05,330	1,17,98,886	3,360	25,42,00,849	20,39,48,758	13,98,589	1,85,79,436	-	22,08,21,534	3,37,60,315	3,80,49,921
8	बिजली संस्थापन / ELECTRIC INSTALLATION	45,20,991			45,20,991	41,42,636		55,755	-	41,98,391	3,21,600	3,78,355
10	पुस्तकालय किताबें / LIBRARY BOOKS	6,61,37,501	2,07,442		6,63,44,943	6,39,59,477	1,64,943	8,99,210	-	6,50,13,630	13,31,313	21,48,024
चालू वर्ष का कुल / TOTAL OF CURRENT YEAR(A)		1,70,82,64,050	7,90,75,294	5,22,804	1,78,68,20,530	1,10,83,63,001	89,18,217	5,79,58,912		1,23,32,37,830	55,35,82,700	53,99,04,049
पिछले वर्ष PREVIOUS YEAR		1,64,17,45,394	6,87,71,300	22,52,644	1,70,82,64,050	1,10,88,42,668	1,28,69,433	4,99,48,481	-	1,16,83,60,001	53,99,04,049	53,48,03,306
B.	पूंजीगत कार्य चालू / CAPITAL WORK IN	9,21,68,379	6,52,07,363	2,66,48,262	10,22,27,679					-	10,22,27,679	9,21,68,379
						TOTAL					65,58,10,379	63,20,72,424

(पट्टा खरीद के आधार पर परिसम्पत्तियों की लागत के रूप में दिए जाने वाले नोट / Note to be given as to cost of assets on hire purchase basis included above)

JAIN GOYAL & ASSOCIATES * CHARTERED ACCOUNTANTS * MUMBAI FRN 143629W

K.P. Sahi

IIG

भारतीय भूचुम्बकत्व संस्थान / **INDIAN INSTITUTE OF GEOMAGNETISM**
न्यू पनवेल, नवी मुंबई / **NEW PANVEL, NAVI MUMBAI – 410 218.**

अनुसूची / **SCHEDULE – 8A(1a)**

वर्ष समाप्ति **31.03.2025 / YEAR ENDING 31.03.2025**

पूर्व स्वामित्व वाली भूमि / FREEHOLD LAND

31/03/24 को / AS ON 31/03/24	**विवरण / PARTICULARS**	**31/03/25 को / AS ON 31/03/25**
रू./Rs पैसे /Ps		रू./Rs पैसे /Ps
10,00,000	इलाहाबाद में क्षेत्रीय केंद्र हेतु भूमि Land for Regional Centre at Allahabad	10,00,000
6,28,726	इ.जी.आर.एल.,तिरूनलवेली हेतु भूमि Land for E.G.R.L., Tirunelvelli	6,28,726
18,64,640	पोर्टब्लेयर हेतु भूमि / Land at Portblair	18,64,640
34,93,366	कुल / **TOTAL**	**34,93,366**

JAIN GANGWAL & ASSOCIATES * CHARTERED ACCOUNTANTS * MUMBAI FRN. 114382W

भारतीय भूचुम्बकत्व संस्थान / INDIAN INSTITUTE OF GEOMAGNETISM
न्यू पनवेल, नवी मुंबई / NEW PANVEL NAVI MUMBAI
वर्ष समाप्ति 31.03.2025 / YEAR ENDED 31-03-2025

भूमि एवं भवन निर्माण /Land And Building
स्थिर परिसंपत्तियां - अचल संपत्ति (पूर्ण स्वामित्व की भूमि पर)
Fixed Assests - Immovable Property (On Freehold land)

अनुसूची / Schedule : 8A 2(a)

अनु. सं. Sr. No	सकल खंड / Gross Block					अवमूल्यन / Depreciation					निवल खंड / Net Block	
	परिसम्पत्ति का विवरण Particulars Of Assests	31.03.2024 को लागत/मूल्य Cost/Value at 31-03-24	वर्ष के दौरान परिवर्धन Additions during the year	वर्ष के दौरान कटौती Deduction during the year	लागत / मूल्य Cost/Value at 31-03-25	01.04.24 पर मूल्य /On Value 01/04/24	वर्ष के दौरान परिवर्धन पर / On addition during the year	वर्ष 2024-25 हेतु / For the year 2024-25	कटौती पर / On deduction	वर्ष के दौरान कटौती पर / Deduction during the year	31.03.25 तक Upto 31-03-25	31-03-24 को शेषित / Cost as at 31-03-24
1	भवन-निर्माण - पूंजीगत कार्य Building - Capital Works	1,07,30,610	-	-	1,07,30,610	77,45,643	-	1,49,248	-	78,94,891	28,35,719	29,84,967
2	भवन-निर्माण -बेलापुर क्वार्टर्स Building - Belapur Quarters	2,09,36,622	-	-	2,09,36,622	1,51,82,257	-	2,87,718	-	1,54,69,975	54,66,647	57,54,365
3	भवन-निर्माण - गुलमर्ग / Building - Gulmarg	1,70,337	-	-	1,70,337	1,56,382	-	698	-	1,57,080	13,257	13,955
4	भवन-निर्माण - नागपुर / Building - Nagpur	31,27,179	-	-	31,27,179	16,32,283	-	74,745	-	17,07,028	14,20,151	14,94,896
5	भवन-निर्माण - अलिबाग मावेआ Building - Alibag Mavacs	18,94,243	-	-	18,94,243	4,95,409	-	69,942	-	5,65,351	13,28,892	13,98,834
6	भवन-निर्माण - पूर्वनिर्मित संरचना Building - Prefabricated Structure	1,55,235	-	-	1,55,235	1,33,481	-	1,087	-	1,34,578	20,657	21,744
7	भवन-निर्माण - अंतरिक्ष विज्ञान प्रयो., कोल्हापुर Building - Space Sci.Lab Kolhapur	1,53,338	-	-	1,53,338	1,26,604	-	1,337	-	1,27,941	25,397	26,734
8	भवन-निर्माण - विल्सन हॉल Building - Wilson Hall	5,31,375	-	-	5,31,375	4,95,571	-	1,790	-	4,97,361	34,014	35,804
9	भवन-निर्माण - पी.आर. रडार टावर कोल्हापुर Building - P.R. Radar Tower Kolhapur	9,72,012	-	-	9,72,012	7,19,427	-	12,629	-	7,32,056	2,39,956	2,52,585
10	भवन-निर्माण - पुडुचेरी/Building-Puducherry	71,86,726	-	-	71,86,726	29,88,475	-	2,10,013	-	31,98,488	39,90,238	42,00,251
11	भवन तथा क्वार्टर्स - ईजी-भरूच Building & Quarters - EGRL	1,08,73,312	-	-	1,08,73,312	64,35,529	-	2,21,889	-	66,57,418	42,15,894	44,37,783
12	भवन-निर्माण - अलिबाग क्वार्टर्स Building - Alibag Quarters	1,30,79,984	-	-	1,30,79,984	66,42,697	-	3,21,884	-	69,64,581	61,15,403	64,37,287
13	भवन-निर्माण - विशाखापट्टनम Building - Vishakhapatnam	25,42,924	-	-	25,42,924	10,99,954	-	72,149	-	11,72,103	13,70,821	14,42,970

JAIN GANGWAL & ASSOCIATES * CHARTERED ACCOUNTANTS * MUMBAI FRN - 114812W

अनु क्र Sr. No	सकल खंड / Gross Block					अवमूल्यन / Depreciation					निवल खंड / Net Block	
	परिसम्पत्ति का विवरण Particulars Of Assets	31.03.2024 को लागतमूल्य Cost/Value at 31-03-24	वर्ष के दौरान परिवर्धन Additions during the year	वर्ष के दौरान कटौती Deduction during the year	लागत / मूल्य Cost/Value at 31-03-25	01.04.24 पर मूल्य /On Value 01/04/24	वर्ष के दौरान परिवर्धन पर / On addition during the year	वर्ष 2024-25 हेतु / For the year 2024-25	कटौती पर / On deduction	वर्ष के दौरान कटौती पर / Deduction during the year	31.03.25 तक Upto 31-03-25	31-03-24 को लागत / Cost as at 31-03-24
14	भवन-निर्माण - जयपुर / Building - Jaipur	57,43,532	20,39,709	-	77,83,241	39,65,454	1,01,985	88,904	-	41,56,343	36,26,898	17,78,078
15	भवन-निर्माण - जी.आर.एल इलाहाबाद Building - GRL Allahabad	6,64,97,290	53,81,765	-	9,38,79,051	4,67,53,540	2,69,089	19,87,187	-	5,10,09,816	4,28,69,235	3,97,43,726
16	भवन-निर्माण - राजकोट / Building - Rajkot	52,72,302	-	-	52,72,302	28,94,155	-	1,18,907	-	30,13,062	22,59,240	23,78,147
17	भवन-निर्माण - शिलांग (बाहरी दीवार) Building - Shillong (Boundry Wall)	1,16,66,979	52,84,732	-	1,69,51,711	52,77,828	2,64,237	3,19,457	-	58,61,522	1,10,90,189	63,89,151
18	भवन-निर्माण, अतिथि गृह, हॉस्टिल - ईजीआरएल Building, Guest House, Hostel-EGRL	4,67,19,083	67,80,118	-	5,74,99,201	2,66,06,224	4,39,008	11,05,643	-	2,81,50,873	2,93,48,328	2,21,12,859
19	भवन-निर्माण - सिलचर / Building - Silchar	2,18,66,796		-	2,18,66,796	83,00,670		6,79,306	-	89,79,976	1,28,86,822	1,35,66,126
20	भवन-निर्माण - कुलाबा (डब्ल्यूडीसी)/ Building-Colaba (WDC)	66,49,996		-	66,49,996	11,77,775		2,73,611	-	14,51,386	51,98,610	54,72,221
21	भवन-निर्माण पोर्टब्लेयर / Building-Portblair	3,22,54,852	4,74,296	-	3,27,29,948	80,57,018	23,715.00	12,09,882	-	92,90,615	2,34,39,333	2,41,97,834
22	भवन-निर्माण - अलिबाग Building - Alibag	58,91,824	-	-	58,91,824	7,65,343	-	2,56,324	-	10,21,667	48,70,157	51,26,481
	कुल / TOTAL	25,89,38,329	2,19,60,546	-	32,08,98,969	14,96,51,729	10,98,032	74,64,330	-	15,82,14,091	16,26,84,878	14,92,86,600

भारतीय भूचुम्बकत्व संस्थान / INDIAN INSTITUTE OF GEOMAGNETISM
न्यू पनवेल, नवी मुंबई / NEW PANVEL, NAVI MUMBAI
वर्ष समाप्ति 31.03.2025/ YEAR ENDED 31-03-2025
भूमि एवं भवन निर्माण /Land And Building
स्थिर परिसंपत्तियां - अचल संपत्ति (पूर्ण स्वामित्व की भूमि पर)
Fixed Assests - Immovable Property (On Leasehold Land)

अनुसूची / SCHEDULE – 8A(1)

अनुसूची No	सकल खंड / Gross Block					मूल्यह्रास / Depreciation					निवल खंड / Net Block	
	परिसम्पत्ति का विवरण Particulars Of Assests	31.03.2024 को लागत/मूल्य Cost/Value at 31-03-24	वर्ष के दौरान परिवर्धन Additions during the year	वर्ष के दौरान कटौती Deduction during the year	लागत / मूल्य Cost/Value at 31-03-25	01.04.24 का मूल्य /On Value 01/04/24	वर्ष के दौरान परिवर्धन पर / On addition during the year	वर्ष 2024-25 हेतु / For the year 2024-25	कटौती पर / On deduction	वर्ष के दौरान कटौती पर / Deduction during the year	31.03.25 तक Upto 31-03-25	31-03-24 को लागत / Cost as at 31-03-24
1	भवन निर्माण - पनवेल Building - Panvel	8,66,88,224	-	-	8,66,88,224	5,44,58,245	-	16,11,499		5,60,69,744	3,06,18,480	3,22,29,979
2	रिसर्च स्कॉलर हॉस्टेल Research Scholar Hostel	1,88,80,074	-	-	1,88,80,074	1,16,34,737	-	3,62,267	-	1,19,97,004	68,83,070	72,45,337
3	अतिथि गृह पनवेल Guest House at Panvel	3,59,43,070	-	-	3,59,43,070	2,06,41,357	-	7,65,086	-	2,14,06,443	1,45,36,627	1,53,01,713
4	भवन-निर्माण - पनवेल में सभागृह तथा भोजनालय Building - Auditorium & Canteen at Panvel	7,58,76,172	-	-	7,58,76,172	3,27,04,964	-	21,58,560	-	3,48,63,524	4,10,12,648	4,31,71,208
5	भवन-निर्माण - निदेशक बंगला, छोटे फ्लैट आवास कर्मचारी निवास स्थान / Building Director Bunglow, Flatlets & Staff Quarters	4,29,39,936	-	-	4,29,39,936	1,85,90,423	-	12,17,476	-	1,98,07,899	2,31,32,037	2,43,49,513
	कुल / TOTAL	**26,03,27,476**	-	-	**26,03,27,476**	**13,80,29,726**	-	**61,14,888**	-	**14,41,44,614**	**11,61,82,862**	**12,22,97,750**

भारतीय भूचुम्बकत्व संस्थान / INDIAN INSTITUTE OF GEOMAGNETISM
न्यू पनवेल, नवी मुंबई / NEW PANVEL NAVI MUMBAI
वर्ष समाप्ति 31.03.2025 / YEAR ENDED 31-03-2025

अनुसूची / SCHEDULE – 8B(A)

अचल संपत्तियों के पूंजीगत कार्य में प्रगति हेतु अग्रिम (अ)
ADVANCES FOR IMMOVABLE PROPERTIES CAPITAL WORKS IN PROGRESS (A)

विवरण / Particulars	01/04/24 को / AS ON 01/04/24	वर्ष के दौरान वृद्धि Additions during the year	वर्ष के दौरान कटौती Deduction during the year	31/03/25 को / AS ON 31/03/25
पूंजीगत कार्य जारी - नागपुर Capital work in progress – Nagpur	10,16,700			10,16,700
पूंजीगत कार्य जारी - राजकोट (सीपीडब्लूडी) Capital work in progress – Rajkot (CPWD)	43,413			43,413
पूंजीगत कार्य जारी - अलीबाग (सीपीडब्लूडी) Capital work in progress – Alibag (CPWD)	2,00,32,568	97,21,328		2,97,54,496
पूंजीगत कार्य जारी - इलाहाबाद Capital work in progress – Allahabad	21,85,672	35,31,328	53,81,785	3,35,215
पूंजीगत कार्य जारी - ईजीआरएल Capital work in progress – EGRL	16,00,000	26,25,197		41,25,197
पूंजीगत कार्य जारी - पोर्टब्लेयर Capital work in progress – Portblair	4,74,542		4,74,296	246
पूंजीगत कार्य जारी - छोटे घर/निदेशक बंगला, कर्मचारी आवास / Capital work in progress – Flatlets/Dir Bung, Staff Qtrs	-			-
पूंजीगत कार्य जारी - विशाखापट्टनम / Capital work in progress – Vishakapatnam	-			-
पूंजीगत कार्य जारी - पनवेल / Capital work in progress – Panvel	1,86,12,441	2,32,32,718	99,15,199	3,19,29,960
पूंजीगत कार्य जारी - छात्रावास / Capital Work in progress - Hostel	-			-
पूंजीगत कार्य जारी - सिलचर / Capital Work in progress - Silchar	1,02,850		1,02,850	-
पूंजीगत कार्य जारी - कुलाबा Capital Work in progress - Colaba	19,05,073	1,53,72,190		1,72,77,263
पूंजीगत कार्य जारी - शिलॉंग / Capital Work in progress - Shillong	44,82,173	27,59,053	52,84,732	19,56,494
पूंजीगत कार्य जारी - बेलापुर / Capital Work in progress - Belapur	51,85,467	94,65,149		1,46,50,616
पूंजीगत कार्य जारी - लेह लद्दाख / Capital Work in progress - Leh Ladak	1,04,566			1,04,566
पूंजीगत कार्य जारी - जयपुर / Capital Work in progress - Jaipur	27,66,580		24,36,100	3,30,480
कुल / TOTAL	**5,84,32,045**	**6,67,07,563**	**2,36,14,962**	**10,15,24,646**

JAIN GUNGWAL & ASSOCIATES * CHARTERED ACCOUNTANTS * FRN : 114 302W

भारतीय भूचुम्बकत्व संस्थान / INDIAN INSTITUTE OF GEOMAGNETISM
न्यू पनवेल, नवी मुंबई / NEW PANVEL NAVI MUMBAI

वर्ष समाप्ति 31.03.2025 / YEAR ENDED 31-03-2025

अनुसूची / SCHEDULE – 8B

चल संपत्तियों के पूंजीगत कार्य में प्रगति हेतु अग्रिम / ADVANCES FOR MOVABLE PROPERTIES CAPITAL WORKS IN PROGRESS (B)

विवरण / Particulars	01.04.2024 को As on 01.04.2024	वर्ष के दौरान वृद्धि Additions during the year	वर्ष के दौरान कटौती Deduction during the year	31.03.2025 को As on 31-03-25
प्रयोगशाला उपकरण हेतु अग्रिम Advances for Laboratory Equipment (Exp.)	37,36,330		30,33,300	7,03,030
उपांतिक राशि / Margin Money	-	-	-	-
कुल / TOTAL	**37,36,330**	-	**30,33,300**	**7,03,030**

पूंजीगत कार्य में प्रगति / CAPITAL WORKS IN PROGRESS

A) अचल संपत्तियों हेतु अग्रिम ADVANCES FOR IMMOVABLE PROPERTIES	10,15,24,646
B) चल संपत्तियों हेतु अग्रिम ADVANCES FOR MOVABLE PROPERTIES	7,03,030
कुल / TOTAL	**10,22,27,676**

Amount will be change automatically

JAIN GANGWAL & ASSOCIATES * CHARTERED ACCOUNTANTS *

वित्तीय विवरण प्रपत्र (गैर-लाभकारी संगठन)

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)

संस्थान का नाम : भारतीय भूचुम्बकत्व संस्थान, न्यू पनवेल, नवी मुंबई - **410 218**

Name Of Entity : Indian Institute Of Geomagnetism, New Panvel, Navi Mumbai – 410 218.

31 मार्च 2025 तक तुलन पत्र के विभिन्न अनुसूची के भाग

SCHEDULE FORMING PART OF BALANCE SHEET AS AT 31ST MARCH 2025

(राशि / Amount – रू./Rs.)

अनुसूची / SHEDULE 9 : अक्षय एवं विशिष्ट प्रयोजनों की निधियों से निवेश INVESTMENTS FROM EARMARKED/ENDOWMENT FUNDS	"वर्तमान वर्ष / Current Year as on 31/03/2025 के अनुसार"	"पिछला वर्ष / Previous Year as on 31/03/2024 के अनुसार"
INVESTMENT-IIG PENSION FUND	8,65,74,392	7,04,06,373
कुल / TOTAL	**8,65,74,392**	**7,04,06,373**

अनुसूची / SHEDULE 10 – निवेश - अन्य / INVESTMENTS – OTHERS		वर्तमान वर्ष / Current Year as on 31/03/2025 के अनुसार	पिछला वर्ष / Previous Year as on 31/03/2024 के अनुसार
1)	सरकारी प्रतिभूति में / In Government Securities	-	-
2)	अन्य अनुमोदित प्रतिभूतियाँ / Other approved Securities	-	-
3)	शेयर्स / Shares (रू. .... के शेयरों की संख्या / no. of shares of Rs.....)	2,750	2,750
4)	ऋणपत्र तथा बांड / Debentures and Bonds	-	-
5)	अनुषंगी तथा संयुक्त काश्तकार / Subsidiaries and Joint Ventures	-	-
	बैंक के साथ एस.डी.आर. / SDR with Bank	-	-
	कुल / TOTAL	**2,750**	**2,750**

वित्तीय विवरण प्रपत्र (गैर-लाभकारी संगठन)
FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
संस्थान का नाम : भारतीय भूचुम्बकत्व संस्थान, न्यू पनवेल, नवी मुंबई - 410 218
Name Of Entity : Indian Institute Of Geomagnetism, New Panvel, Navi Mumbai – 410 218.
31 मार्च 2025 तक तुलन पत्र के भाग के रूप में अनुसूची
SCHEDULE FORMING PART OF BALANCE SHEET AS AT 31ST MARCH 2025

(राशि / Amount – ₹ /Rs.)

अनुसूची 11: वर्तमान परिसंपत्तियां, ऋण, अग्रिम आदि: **SCHEDULE 11 : CURRENT ASSETS, LOANS, ADVANCES ETC.**			**Current Year as at 31st March-2025**	**Previous Year as at 31st March-2024**
क / A. वर्तमान परिसंपत्तियां / CURRENT ASSESTS				
1)	सामग्री सूची / Inventories			
	क/a	भंडार और अतिरिक्त सामान (भंडार में अभिशेष / Stores and spares (closing bal. in stores)	353438.5	3,09,075
	ख/b	खुले औजार / Loose Tools		
	ग/c	व्यापार में भंडार / Stock-in-Trade		
		तैयार माल / Finished Goods		
		कार्य प्रगति पर है / Work-in-Progress		
		कच्चा माल / Raw Materials		
2)	विविध देनदार: / Sundry Debtors:			
	क/a	छह महीने से अधिक की अवधि के बकाया ऋण / Debts Outstanding for a period exceeding six months	12935	1,03,304
	ख/b	अन्य / Others	-	-
			-	-
3)	हाथ में नकद शेष राशि (चेक / ड्राफ्ट और अग्रदाय सहित) / Cash Balances in hand (including cheques / drafts and imprest)			
	प्रधान कार्यालय / Head Office —		39,017	39,017
	उप कार्यालय / Sub Office	9017		
	आपातकाल के लिए नकदी / Cash for emergency	25000		
	खुदरा नकदी / Petty Cash	5000		
4)	बैंक में शेष राशियां / Bank Balances			
	क/a)	अनुसूचित बैंकों के साथ / With Scheduled Banks:		
		चालू खातों पर - बैंक ऑफ इंडिया, पनवेल / On Current Accounts – Bank of India, Panvel	2,19,70,117	1,95,49,459
		चालू खातों पर - बैंक ऑफ इंडिया, पनवेल / On Current Accounts – Bank of India, Panvel (SERB)	-	-
		यूनियन बैंक ऑफ इंडिया, पनवेल /Union Bank of India, Panvel	11,83,045	50,33,805
		बैंक ऑफ इंडिया, एलसी खाता 361 /Bank of India, LC A/c. 361	1,69,31,210	91,97,429
		ISRO BANK ACCOUNT	1,536	1,039
		HDFC A/C 50200094100046	1,38,49,205	1,00,00,000
		– Bank of India -IIG PENSION A/c	1,41,487	97,58,898
		उपकरणों की खरीद हेतु एसडीआर / SDR against purchase of	59,17,683	3,08,92,381
5)	एसडीआर में निवेश / Investment in SDR		-	-
6)	फ्रेंकिंग मशीन के लिए अग्रिम / Advance for Franking Machine (Stamp in hand)		-	62,782
7)	पूर्वदत्त व्यय / Prepaid Expenses		-	-
	कुल (क) TOTAL (A)		**6,06,99,676**	**7,89,96,990**

वित्तीय विवरण प्रपत्र (गैर-लाभकारी संगठन)
FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
संस्थान का नाम : भारतीय भूचुम्बकत्व संस्थान, न्यू पनवेल, नवी मुंबई - 410 218
Name Of Entity : Indian Institute Of Geomagnetism, New Panvel, Navi Mumbai – 410 218.
31 मार्च 2025 तक तुलनपत्र के भाग के रूप में अनुसूची
SCHEDULE FORMING PART OF BALANCE SHEET AS AT 31ST MARCH 2025

(राशि / Amount – ₹/Rs.)

अनुसूची 11: वर्तमान परिसंपत्तियां, ऋण, अग्रिम आदि। SCHEDULE 11 : CURRENT ASSETS, LOANS, ADVANCES ETC.			Current Year as at 31st March-2025	Previous Year as at 31st March-2024
ख/B. ऋण, अग्रिम एवं अन्य परिसंपत्तियां LOANS, ADVANCES AND OTHER ASSETS				
1)	ऋण / Loans			
	क/a	कर्मचारी / Staff	34,87,210	72,75,529
	ख/b	संस्थान के समान गतिविधियों / उद्देश्यों में लगे अन्य संस्थान / Other entities engaged in activities / objectives similar to that of the entity		
	ग/c	अन्य (निर्दिष्ट करें) - आकस्मिक अग्रिम / Other (specify)- Contingent Advances	10,54,061	1,72,32,187
	घ/d	Imprest & Science Outreach advances	4,05,387	4,37,098
2)	प्राप्त होने वाले मूल्य के लिए / नकद वस्तुओं में वसूलने योग्य / अग्रिम और अन्य राशियाँ / Advances and other amounts recoverable in cash or in kind for value to be received			
	क/a	पूंजीगत लेखा में / On Capital A/c	-	-
	ख/b	पूर्व भुगतान / Pre-payments	-	-
	ग/c	अन्य / Others	28,85,744	28,30,644
3)	आय उपार्जित / Income Accrued			
	a)	निधीरित / अक्षय निधियों से निवेश पर / On investments from earmarked / endowment funds	-	-
	b)	निवेश पर - एलसी पर एसडीआर का अन्य उपार्जित ब्याज / On investments – Others Accrued interest of SDR on LC	-	-
	c)	एसडीआर में निवेश पर / On investment in SDR	-	-
	d)	अन्य (जिसमें अघोषित रूप से देय आय शामिल है .....) एचबीए पर ब्याज और प्राप्य ब्याज / Others (includes income due unrealized Rs. .....) Accrued interest on HBA & interest receivable	-	-
4)	प्राप्य दावे / Claims Receivable		-	-
5)	प्राप्य टीडीएस, एसजीएसटी, सीजीएसटी और आईजीएसटी, एसडीआर पर ब्याज प्राप्य / TDS /TCS, SGST, CGST & IGST RECEIVABLE		3,11,15,560	3,33,74,650
	कुल (बी) / TOTAL (B)		3,89,47,961	6,11,50,107
	कुल (ए + बी) / TOTAL (A + B)		9,96,47,637	14,01,47,097

JAIN GANGWAL & ASSOCIATES * CHARTERED ACCOUNTANTS * MUMBAI FRN 111362W

भारतीय भूचुम्बकत्व संस्थान / INDIAN INSTITUTE OF GEOMAGNETISM
न्यू पनवेल, नवी मुंबई / NEW PANVEL NAVI MUMBAI

वर्ष समाप्ति 31.03.2025 / YEAR ENDED 31-03-2025

सामग्रियां / INVENTORIES

अनुसूची / Sch :11 A (1)

विवरण / Particulars	प्रारंभिक शेष / Opening Balance	खरीद / Purchases	अंतिम शेष / Closing Balance	उपभोग / Consumption
कंप्यूटर लेखन-सामग्री / Computer Stationery	79,550	3,41,146	95,640	3,25,056
लेखन-सामग्री / लेखा तालिका और सामग्री का मुद्रण: Stationery / Chart Rolls & Printing of stationery : 1) लेखन-सामग्री / लेखा तालिका / Stationery / Chart Rolls 2) लेखन सामग्री का मुद्रण / Printing of stationery	1,86,577	10,80,351	1,97,393	10,69,535
विद्युतीय सामान और इलेक्ट्रोनिक पुर्जे / Electrical Goods & Electronic Components	93,442	32,21,026	60,406	32,54,062
छायांकन सामान / Photo Goods	39,506	86,413	-	1,25,919
कुल / TOTAL	**3,99,075**	**47,28,935**	**3,53,439**	**47,74,572**

JAIN GANGWAL & ASSOCIATES * CHARTERED ACCOUNTANTS *

भारतीय भूचुम्बकत्व संस्थान / INDIAN INSTITUTE OF GEOMAGNETISM
न्यू पनवेल, नवी मुंबई / NEW PANVEL NAVI MUMBAI– 410 218.

अनुसूची / SCHEDULE – 11A(2b)

वर्ष समाप्ति 31.03.2025 / YEAR ENDED 31-03-2025

अन्य के पास अग्रिम और जमा करें / ADVANCE AND DEPOSITS WITH OTHERS

AS ON 31/03/24 तक RS. PS.	विवरण / PARTICULARS	AS ON 31/03/25 तक RS. PS.
74,387	टेली / टेलेक्स एमटीएनएल के पास जमाराशि / Deposit Tele / Telex MTNL	74,387
55,440	एमएसईबी, अलीबाग के पास जमाराशि / Deposit MSEB, Alibag	55,440
14,200	एलपीजी गैस (मुंबई और पनवेल) के पास जमाराशि / Deposit LPG Gas (Mumbai & Panvel)	14,200
62,708	टेलीफोन (सभी आउटस्टेशन) के पास जमाराशि / Deposit Telephones (All outstations)	62,708
3,470	बेस्ट सुरक्षा के पास जमाराशि / Deposit BEST Security	3,470
5,560	आवासीय बेस्ट के लिए सबसे अच्छा जमा / Deposit BEST for Residential Qtrs.	5,560
17,720	एमएसईबी और एमएसईबीडी,नागपुर के पास जमाराशि सुरक्षा / Deposit Security Deposit MSEB & MSED, Nagpur	17,720
19,420	तमिलनाडु बिजली बोर्ड के पास जमाराशि / Deposit Tamilnadu Electricity Board	19,420
2,94,300	एमएसईबी, बेलापुर के पास जमाराशि / Deposit MSEB, Belapur	2,94,300
23,920	बिजली तिरुनेलवेली के पास जमाराशि / Deposit Electricity Tirunelveli	23,920
950	एलपीजी गैस (सभी आउटस्टेशंस) के पास जमाराशि / Deposit LPG Gas (All Outstations)	950
32,090	के पास जमाराशि सिडको भूमि / Deposit CIDCO Land	32,090
9,747	विद्युत कनेक्शन के पास जमाराशि जीआरएल / Deposit Electric Connection GRL	9,747
500	टेलीफोन राजकोट के पास जमाराशि / Deposit Telephone Rajkot	500
8,555	के पास जमाराशि राजस्थान बिजली (बोर्ड) जयपुर / Deposit Rajasthan Electricity (Board) Jaipur	8,555
550	एचपी गैस, पनवेल के पास जमाराशि / Deposit HP Gas, Panvel	550
700	बीएसएनएल जयपुर के पास जमाराशि / Deposit BSNL Jaipur	700
1,000	बीएसएनएल पोर्ट ब्लेयर के पास जमाराशि / Deposit BSNL Port Blair	1,000
3,000	के पास जमाराशि बीएसएनएल राजकोट / Deposit BSNL Rajkot	3,000
48,000	सिडको (डीआईआर बंग और फ्लैट) के पास जमाराशि / Deposit CIDCO (DIR BUNG & FLAT)	48,000
11,000	यूपीपीसीएल (इलाहाबाद) के पास जमाराशि / Deposit UPPCL (Allahabad)	11,000
64,333	बिजली पोर्टब्लेयर के पास जमाराशि / Deposit Elect. Portblair	64,333
2,200	अलीबाग के पास जमाराशि सुरक्षा / Deposit Security MSED Alibag	2,200
3,150	के पास जमाराशि पुष्पक गैस राजकोट / Deposit Pushpak Gas Rajkot	3,150
1,850	एलपीजी गैस पोर्टब्लेयर के पास जमाराशि / Deposit [illegible] Portblair	1,850
1,900	एलपीजी गैस सिलचर के पास जमाराशि / Deposit LPG GAS Silchar	1,900

Contd.Page-2

1,00,000	असम सिलचर के पास जमाराशि सुरक्षा / Deposit Security at Assam Silchar	1,00,000
1,000	बैंक खाता राजकोट के पास जमाराशि / Deposit Bank A/c. Rajkot	1,000
1,000	बैंक खाता अलीबाग के पास जमाराशि / Deposit Bank A/c. Alibag	1,000
1,000	बैंक खाता विशाखापट्टनम के पास जमाराशि / Deposit Bank A/c. Vishakhapatanam	1,000
1,000	बैंक खाता सिलचर के पास जमाराशि / Deposit Bank A/c. Silchar	1,000
500	बैंक खाता नागपुर के पास जमाराशि / Deposit Bank A/c. Nagpur	500
3,430	बिजली एमएसईडीसीएल, अलीबाग के पास जमाराशि / Deposit Electric MSEDCL, Alibag	3,430
5,170	बिजली विशाखापट्टनम के पास जमाराशि / Deposit Electric Vishakhapatnam	5,170
52,857	नालंदा डेकोर के पास जमाराशि / Deposit Nalanda Decor	52,857
25,000	विक्ट्री ऑटोमोबाइल्स के पास जमाराशि / Deposit Victory Automobiles	25,000
2,430	एमएसईडीसीएल बेलापुर क्वार्टर के पास जमाराशि / Deposit MSEDCL Belapur quarters	2,430
3,720	एमएसईडीसीएल कोल्हापुर के पास जमाराशि / Deposit MSEDCL Kolhapur	3,720
16,50,422	एमएसईडीसीएल पनवेल के पास जमाराशि / Deposit MSEDCL Panvel	17,05,522
1,52,175	एनएचपीसी खाता / NHPC A/c.	1,52,175
66,890	एनएमआरएल/ डीआरडीओ परियोजना / NMRL/DRDO Project	66,890
370	बिजली जमाराशि-नागपुर / Electricity Deposit-Nagpur	370
1,360	बिजली मीटर कोलाबा की सुरक्षा जमाराशि / Security Deposit of Electric Meter Colaba	1,360
1,670	बिजली मीटर कोल्हापुर की सुरक्षा जमा / Security Deposit of Electric Meter Kolhapur	1,670
28,30,644	**कुल / TOTAL**	**28,85,744**

JAIN GANGWAL & ASSOCIATES * CHARTERED ACCOUNTANTS * MUMBAI FRN 134362W

K.R.Sahi

भारतीय भूचुम्बकत्व संस्थान / INDIAN INSTITUTE OF GEOMAGNETISM
न्यू पनवेल, नवी मुंबई / NEW PANVEL NAVI MUMBAI– 410 218.

अनुसूची / SCHEDULE 11B(1)

वर्ष समाप्ति 31.03.2025 / YEAR ENDED 31-03-2025

कर्मचारीयों को अग्रिम / ADVANCE TO STAFF

AS ON 31/03/24 तक	PARTICULARS	AS ON 31/03/25 तक
RS. PS.		RS. PS.
10,33,270	यात्रा भत्ता / Travelling Allowance	2,96,100
1,53,442	छुट्टी यात्रा रियायत Leave travel concession	4,80,767
-	स्कूटर / Scooter	
-	आवास निर्माण / House Building	
69,422	विदेशी टी. ए. / Foreign T.A.	3,52,343
26,000	कंप्यूटर / Computer	2,000
-	मोटर गाड़ी / Motor Car	
59,93,395	कठिन कर्तव्य (ड्यूटी) भत्ता / Hard Duty Allowance	10,96,000
-	स्थानांतरण पर टीए / TA on Transfer	
-	चिकित्सा अग्रिम / Medical Advance	12,60,000
72,75,529	**कुल / TOTAL**	**34,87,210**

JAIN GANGWAL & ASSOCIATES * CHARTERED ACCOUNTANTS * MUMBAI FRN :134382W

वित्तीय विवरण प्रपत्र (गैर-लाभकारी संगठन)
FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
संस्थान का नाम : भारतीय भूचुम्बकत्व संस्थान, न्यू पनवेल, नवी मुंबई - 410 218
Name Of Entity : Indian Institute Of Geomagnetism, New Panvel, Navi Mumbai – 410 218.
31 मार्च 2025 के आय तथा व्यय के भाग के रूप में अनुसूची
SCHEDULE FORMING PART OF INCOME & EXPENDITURE FOR THE YEAR ENDED 31ST MARCH 2025

(राशि / Amount – रू./Rs.)

अनुसूची 12: बिक्री / सेवाओं से आय SCHEDULE 12 : INCOME FROM SALES / SERVICES		31.03.2025 वर्तमान वर्ष को समाप्त /Current Year Ended 31st March-2025	31.03.2024 पिछला वर्ष को समाप्त /Previous Year Ended 31st March-2024
1)	डेटा की बिक्री, पीपीएम और उपकरणों के अंशांकन / Sale of data, PPM & Caliberation of equipment	6,18,000	1,80,000
कुल /TOTAL		**6,18,000**	**1,80,000**

अनुसूची 13: अनुदान / सब्सिडी(अपरिवर्तनीय अनुदान और अनुवृत्ति प्राप्त) / SCHEDULE 13 : GRANTS/SUBSIDIES (Irrevocable Grants & Subsidies Received)		31.03.2025 वर्तमान वर्ष को समाप्त /Current Year Ended 31st March-2025		31.03.2024 पिछला वर्ष को समाप्त /Previous Year Ended 31st March-2024	
1)	केंद्र सरकार - विज्ञान और प्रौद्योगिकी विभाग से प्राप्त /Central Government - Received from Department of Science & Technology	66,07,72,534		54,63,66,931	
	घटाया : सहायता अनुदान पूंजी का पूंजी खाते में स्थानांतरण किया गय / Less : Grant-in-Aid Capital Transferred to Capital Account	9,66,87,394	56,40,85,140	2,83,68,009	51,79,98,922
2)	राज्य सरकार / State Government		-		-
3)	सरकारी संस्थाऐं / Government Agencies		-		-
4)	संस्थान / कल्याण निकाय / Institutions/welfare Bodies		-		-
5)	अंतरराष्ट्रीय संगठन / International Organizations		-		-
6)	अन्य (निर्दिष्ट करें) / Others (Specify)		-		-
	कुल / TOTAL		**56,40,85,140**		**51,79,98,922**

JAIN GANGWAL & ASSOCIATES CHARTERED ACCOUNTANTS FRN: 114182W

वित्तीय विवरण प्रपत्र (गैर-लाभकारी संगठन)

FORM OF FINANCIAL STATEMENTS (NON-PROFT ORGANISATIONS)

संस्थान का नाम : भारतीय भूचुम्बकत्व संस्थान, न्यू पनवेल, नवी मुंबई - 410 218

Name Of Entity : Indian Institute Of Geomagnetism, New Panvel, Navi Mumbai – 410 218.

31 मार्च 2025 तक तुलन पत्र के भाग के रूप में अनुसूची

SCHEDULE FORMING PART OF INCOME & EXPENDITURE FOR THE YEAR ENDED 31ST MARCH 2025

(राशि / Amount – रू./Rs.)

अनुसूची 14: फीस / अंशदान / SCHEDULE 14 : FEES / SUBSCRIPTION		31.03.2025 वर्तमान वर्ष को समाप्त /Current Year Ended 31st March-2025	31.03.2024 पिछला वर्ष को समाप्त /Previous Year Ended 31st March-2024
1)	प्रवेश शुल्क / Entrance Fees	-	-
2)	वार्षिक शुल्क / अंशदान / Annual Fees / Subscriptions	-	-
3)	संगोष्ठी / कार्यक्रम शुल्क / Seminar / Program Fees	-	-
4)	परामर्श शुल्क / Consultancy Fees	-	-
5)	अन्य (निर्दिष्ट करें) / Others (Specify)	-	-
	क/a सीजीएचएस अंशदान / CGHS contribution	-	-
	ख/b सेवा शुल्क-आयआयजी / Service charges – IIG	21,176	18,564
	ग/c लाइसेंस शुल्क-आयआयजी / License fees – आयआयजी IIG	6,28,200	6,29,469
कुल / TOTAL		**6,49,376**	**6,48,033**

*नोट: प्रत्येक आइटम के लिए लेखांकन नीतियों का खुलासा किया जाना है / **Note : Accounting Policies towards each item are to be disclosed***

JAIN GANGWAL & ASSOCIATES * CHARTERED ACCOUNTANTS *

वित्तीय विवरण प्रपत्र (गैर-लाभकारी संगठन)
FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
संस्थान का नाम : भारतीय भूचुम्बकत्व संस्थान, न्यू पनवेल, नवी मुंबई - **410 218**
Name Of Entity : Indian Institute Of Geomagnetism, New Panvel, Navi Mumbai – 410 218.
31 मार्च 2025 तक आय तथा व्यय के विभिन्न अनुसूची के भाग
SCHEDULE FORMING PART OF INCOME & EXPENDITURE FOR THE YEAR ENDED 31ST MARCH 2025
(राशि / Amount – रू./Rs.)

अनुसूची 15: निवेश से आय / SCHEDULE 15 : INCOME FROM INVESTMENTS (निवेश पर आय : निर्धारित / अक्षय निधियों से निधियों में स्थानांतरित) (Income on Invest. From Earmarked/Endowment Funds transferred to Funds)	31.03.2025 वर्तमान वर्ष को समाप्त / Current Year as on 31/03/2025	31.03.2024 वर्तमान वर्ष को समाप्त / Current Year as on 31/03/2024
	शून्य / NIL	शून्य / NIL
कुल / TOTAL	शून्य / NIL	शून्य / NIL

अनुसूची 16: रॉयल्टी, प्रकाशन आदि से आय / SCHEDULE 16 : INCOME FROM ROYALTY, PUBLICATION ETC. (निवेश पर आय : निर्धारित / अक्षय निधियों से निधियों में स्थानांतरित) (Income on Invest. From Earmarked/Endowment Funds transferred to Funds)	31.03.2025 वर्तमान वर्ष को समाप्त / Current Year as on 31/03/2025	31.03.2024 वर्तमान वर्ष को समाप्त / Current Year as on 31/03/2024
	शून्य / NIL	शून्य / NIL
कुल / TOTAL	शून्य / NIL	शून्य / NIL

JAIN DANGHAT ASSOCIATES CHARTERED ACCOUNTANTS

वित्तीय विवरण प्रपत्र (गैर-लाभकारी संगठन)
FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
संस्थान का नाम : भारतीय भूचुम्बकत्व संस्थान, न्यू पनवेल, नवी मुंबई - 410 218
Name Of Entity : Indian Institute Of Geomagnetism, New Panvel, Navi Mumbai – 410 218.
31 मार्च 2025 तक आय तथा व्यय के विभिन्न अनुसूची के भाग

अनुसूची 17: ब्याज प्राप्त / SCHEDULE 17 : INTEREST EARNED			31.03.2025 वर्तमान वर्ष को समाप्त /Current Year Ended 31st March-2025	31.03.2024 पिछला वर्ष को समाप्त /Previous Year Ended 31st March-2024
1)	सावधि जमा पर: / On Term Deposits:			
	क/a	अनुसूचित बैंकों के साथ / With Scheduled Banks	-	-
	ख/b	अनुसूचित बैंकों (बैंक ऑफ इंडिया) के साथ - एसडीआर * / एलसी में निवेश से / With Scheduled Banks (Bank of India) - From investment in SDR */LC	-	-
	ग/c	संस्थानों के साथ / With Institutions	-	-
2)	बचत खातों पर / On Savings Accounts		1,50,332.69	6,41,293.00
	क/a	अनुसूचित बैंकों के साथ / With Scheduled Banks	-	-
	ख/b	गैर-अनुसूचित बैंकों के साथ / With Non-Scheduled Banks	-	-
	ग/c	डाकघर बचत खाता / Post office Savings A/cs	-	-
	घ/d	अन्य / Others	1,55,05,761.00	1,19,88,289.00
3)	ऋण पर / On Loans		-	-
	क/a	कर्मचारी वर्ग / Staff Members	0.00	-
	ख/b	अन्य / Others		-
4)	देनदार और अन्य प्राप्य पर ब्याज / Interest on Debtors and Other Receivables		0.00	-
	कुल / TOTAL		1,56,56,093.69	1,26,29,582
टिप्पणी: स्रोत पर कर की कटौती दर्शाई जाए / Note : Tax deducted at source to be indicated				

वित्तीय विवरण प्रपत्र (गैर-लाभकारी संगठन)
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Name Of Entity : Indian Institute Of Geomagnetism, New Panvel, Navi Mumbai – 410 218.
31 मार्च 2025 तक आय तथा व्यय के विभिन्न अनुसूची के भाग
SCHEDULE FORMING PART OF INCOME & EXPENDITURE FOR THE YEAR ENDED 31ST MARCH 2025

(राशि / Amount – रू./Rs.)

अनुसूची 18: अन्य आय / SCHEDULE : OTHER INCOME			31.03.2025 वर्तमान वर्ष को समाप्त /Current Year Ended 31st March-2025	31.03.2024 पिछला वर्ष को समाप्त /Previous Year Ended 31st March-2024
1)	परिसंपत्तियों की बिक्री / निपटान पर लाभ / Profit on Sale / disposal of Assets:			
	क/a	स्वामित्व वाली परिसंपत्ति / Owned assets	0	0
	ख/b	अनुदान से प्राप्त या मुफ्त प्राप्त परिसंपत्ति / Assets acquired out of grants, or received free of cost	0	0
2)	परियोजना से आय / Income from Project		1,00,000	5,44,000
3)	डेटा की बिक्री, पीपीएम और उपकरणों के अंशांकन / Sale of data, PPM & Caliberation of equipment		-	-
4)	विविध आय / Miscellaneous Income			
	क/a	छात्रावास / अतिथि गृह से आय / Income from hostel / Guest house	12,39,916	12,38,929
	ख/b	विविध प्राप्तियां / Miscellaneous receipt	16,92,774	20,69,148
	ग/c	वापस न ली गई जमा राशि / Un-claimed Deposit	-	17,95,886
5)	STP 15 Incomes		-	-
	कुल / TOTAL		**30,32,690**	**56,47,962**

अनुसूची 18: अन्य आय / SCHEDULE 18 (a) : परिसम्पत्ति की बिक्री होने पर अन्य आय / Profit on sale of assets			31.03.2025 वर्तमान वर्ष को समाप्त / Current Year Ended 31st March-2025	31.03.2024 पिछला वर्ष को समाप्त / Previous Year Ended 31st March-2024
		परिसम्पत्ति की बिक्री होने पर अन्य आय /		
	1	Profit/ loss on sale of assets	-277889	2,66,506
		कुल / TOTAL	**(2,77,889)**	**2,66,506**

JAIN GANGWAL & ASSOCIATES * CHARTERED ACCOUNTANTS *

वित्तीय विवरण प्रपत्र (गैर-लाभकारी संगठन)
FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
संस्थान का नाम : भारतीय भूचुम्बकत्व संस्थान, न्यू पनवेल, नवी मुंबई - 410 218
Name Of Entity : Indian Institute Of Geomagnetism, New Panvel, Navi Mumbai – 410 218.
31 मार्च 2025 तक आय तथा व्यय के विभिन्न अनुसूची के भाग

SCHEDULE FORMING PART OF INCOME & EXPENDITURE FOR THE YEAR ENDED 31ST MARCH 2025

(राशि / Amount – रू./Rs.)

अनुसूची 19: तैयार माल के भंडार एवं प्रगतिगत कार्य में वृद्धि/ (कमी) के परिणाम में / SCHEDULE 19 : INCREASE/(DECREASE) IN STOCK OF FINISHED GOODS & WORK IN PROGRESS	31.03.2025 वर्तमान वर्ष को समाप्त / Current Year as on 31/03/2025	31.03.2024 पिछला वर्ष को समाप्त / Previous Year as on 31/03/2024
	शून्य / NIL	शून्य / NIL
कुल / TOTAL	शून्य / NIL	शून्य / NIL

अनुसूची 20: स्थापना के व्यय / SCHEDULE 20 : ESTTABLISHMENT EXPENSES		31.03.2025 वर्तमान वर्ष को समाप्त / Current Year Ended 31st March-2025	31.03.2024 पिछला वर्ष को समाप्त / Previous Year Ended 31st March-2024
क/a	वेतन / Salaries	27,62,03,289	24,52,03,188
ख/b	भत्ते और बोनस / Allowances and Bonus	90,84,350	18,68,252
ग/c	सीपीएफ में नियोक्ता का अंशदान / Employers Contribution to CPF	-	-
घ/d)	पेंशन भुगतान/ Expenses towards Pension payment	7,55,35,714	7,35,50,931
e)	परोपकारी निधि के लिए नियोक्ता का अंशदान / Employers Contribution to Benevolent Fund	-	-
च/f)	कर्मचारी सेवानिवृत्ति और टर्मिनल लाभ पर व्यय / Expenses on Employees Retirement and Terminal Benefits	6,27,22,142	1,76,57,684
छ/g)	अन्य (निर्दिष्ट करें) (चिकित्सा व्यय) / Others (specify) (Medical Expenses)	67,46,992	54,69,847
ज/h)	मनोरंजन क्लब में नियोक्ता का अंशदान / Employers contribution to Recreation Club	2,39,200	71,575
i)	नई अंशदायी पेंशन निधि में नियोक्ताओं का योगदान / Employers contribution to New Contributory Pension Fund	1,63,41,506	1,40,94,126
झ/j)	कर्मचारी मृत्यु लाभ पर व्यय / Expenses on Employees Death Benefits	-	-
कुल / TOTAL		**44,68,75,193**	**35,79,15,603**

JAIN GANGWAL & ASSOCIATES * CHARTERED ACCOUNTANTS * FRN : 144362W

भारतीय भूचुम्बकत्व संस्थान / INDIAN INSTITUTE OF GEOMAGNETISM
न्यू पनवेल, नवी मुंबई / NEW PANVEL NAVI MUMBAI – 410 218.

अनुसूची /SCHEDULE – 20A

31/03/2025 को समाप्त वर्ष / YEAR ENDING 31/03/2025

A. वेतन / SALARIES

विवरण / PARTICULARS	31.03.2025 तक AS ON 31/03/25 रू./RS. पै./PS.
वेतन तथा भत्ते / Pay and Allowances	24,99,38,387
शोध छात्रों को रिसर्च छात्रवृत्ति / वजीफा / Research Scholarship / Stipend to Res. students	2,62,64,902
कुल / TOTAL	**27,62,03,289**

JAIN GANGWAL & ASSOCIATES * CHARTERED ACCOUNTANTS * MUMBAI FRN: [illegible]

K.R.Salve

भारतीय भूचुम्बकत्व संस्थान
INDIAN INSTITUTE OF GEOMAGNETISM

न्यू पनवेल, नवी मुंबई - **410 218**
NEW PANVEL, NAVI MUMBAI – 410 218.

अनुसूची / **SCHEDULE – 20B**

31/03/2025 को समाप्त वर्ष / **YEAR ENDING 31/03/2025**

भत्ते तथा बोनस / ALLOWANCES & BONUS

विवरण / PARTICULARS	31.03.2025 तक AS ON 31/03/25
	रू./RS. पै./PS.
मानदेय / Honorarium	-
समयोपरि / Overtime	-
कठिन कार्य भत्ता / Hard Duty Allowance	68,71,406
भोजन भत्ता / Mess Allowances	2,78,949
संतान शिक्षा भत्ता / शिक्षा शुल्क की प्रतिपूर्ती Children Education Allowance / Reimbursement of Tution Fees	19,33,993
कुल / **TOTAL**	**90,84,350**

JAIN GANGWAL & ASSOCIATES * CHARTERED ACCOUNTANTS * MUMBAI

K.R.Salve

वित्तीय विवरण प्रपत्र (गैर-लाभकारी संगठन)
FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
संस्थान का नाम : भारतीय भूचुम्बकत्व संस्थान, न्यू पनवेल, नवी मुंबई - **410 218**
Name Of Entity : Indian Institute Of Geomagnetism, New Panvel, Navi Mumbai – 410 218.
31 मार्च 2025 तक का आय तथा व्यय विवरण के भाग की अनुसूची
SCHEDULE FORMING PART OF INCOME & EXPENDITURE FOR THE YEAR ENDED 31ST MARCH 2025
(राशि / Amount – रू./Rs.)

अनुसूची 21 : अन्य प्रशासनिक खर्च **SCHEDULE 21 : OTHER ADMINISTRATIVE EXPENSES**		वर्तमान वर्ष **Current Year**	पिछला वर्ष **Previous Year**
1	विज्ञापन तथा प्रचार / Advertisement and Publicity	1,95,801	4,05,070
2	बैंक चार्ज / Bank charges	6,695	22,972
3	बाईंडिंग खर्च / Binding charges	-	16,180
4	भोजनालय अनुवृत्ति / Canteen Subsidy		19,405
5	विद्युत तथा ऊर्जा / खर्च / Electricity and power / Charges	1,56,07,547	1,27,81,507
6	मनोरंजन / आतिथ्य / Entertainment / Hospitality	8,21,230	3,96,609
7	उद्यान खर्च / Garden Expenses	1,39,431	13,655
8	अतिथि गृह रखरखाव / खर्च, अतिथिगृह वस्तु / Guest house maintenance / Charges Guest house items	2,49,167	5,53,700
9	हिंदी व्यवस्था / पुरस्कार / Hindi expenses / awards	10,99,752	3,37,339
10	भा.भू.सं. वार्षिक दिवस खाता / IIG Annual Day A/c	4,04,749	4,30,054
11	बीमा / Insurance	90,008	22,374
12	वर्दी / Liveries	-	-
13	बैठक खर्च / Meeting expenses	4,67,692	73,294
14	अन्य खर्च / Miscellaneous expenses	2,78,274	2,03,455
15	डाक, दूरभाष तथा संचार खर्च / इंटरनेट खर्च Postage, Telephone and Communication Charges / Internet charges	31,72,949	45,20,034
16	व्यावसायीक खर्च / सलाहकार खर्च/ Professional Charges / Consultancy Charges	7,97,895	3,21,899
	शेष / Balance c/f	**2,33,51,190**	**2,01,17,547**

JAIN GANGWAL & ASSOCIATES CHARTERED ACCOUNTANTS FRN: 117432N

K.P.Rao

अनुसूची 21 : अन्य प्रशासनिक खर्च SCHEDULE 21 : OTHER ADMINISTRATIVE EXPENSES		वर्तमान वर्ष Current Year	पिछला वर्ष Previous Year
	आगे लाया गया / Brought Forward	**2,33,51,190**	**2,01,17,547**
17	पंजिकरण शुल्क / Registration fees	1,41,376	2,19,020
18	किराया, दरें तथा कर / Rent, Rates and Taxes	6,26,552	11,90,263
19	मरम्मत तथा रखरखाव / Repairs and Maintenance	89,14,679	1,18,41,908
20	विज्ञान सप्ताह समारोह / प्रदर्शनी / Science week celebration / Exhibition	4,47,795	3,52,556
21	सुरक्षा सुविधाएं / Security services	6,26,48,647	5,78,87,592
22	कर्मचारी कल्याण / Staff welfare /Momento	2,20,650	25,000
23	भंडार उपभुक्त / Stores consumed	47,74,572	54,04,129
24	सर्वेक्षण खर्च / Survey expenses	22,299	74,574
25	यात्रा तथा परिवहन खर्च / Traveling and Conveyance Expenses	1,73,49,229	1,15,91,729
26	वाहन रखरखाव / Vehicle maintenance	8,25,326	9,12,894
27	अतिथि वैज्ञानिक / संगोष्ठी / शुल्क इत्यादि / Visiting scientist / seminar / fees etc (ODA/ AIDON workshop expenses)	3,79,107	1,14,269
28	जर्नल सब्स्क्रिप्शन/ Journal Subscription		36,27,559
29	जल शुल्क / Water charges	3,07,593	3,64,827
30	आकस्मिक मजदूरों की मजदूरी / Wages to Contingent Mazdoors	2875693	35,30,635
31	कर्मचारियों को प्रशिक्षण कार्यक्रम / Training Programme to staff	43,900	66,720
32	एएमसी रखरखाव / AMC Maintenance	3977536	34,99,197
33	कार्यालय खर्च / Office Expenses	6,18,355	11,57,132
34	राइट ऑफ खर्च / Write off Expenses		1,31,640
35	लेख प्रसंस्करण शुल्क / Article Processing Fee		2,50,059
36	आकस्मिकता अनुदान / Contingency Grant		1,05,233
37	इम्प्रेस खर्च / Impress expenses	11,14,183	4,79,468
38	विज्ञान आउटरीच खर्च / Science Outreach Expenses	84,448	4,63,722
39	मानदेय / Honorarium	3,82,182	1,69,700
40	जीएसटी खर्च / GST Expenses	7,75,512	1,43,738
41	जीएसटी ब्याज / GST Interest & TDS Interest		62,064
42	देय ब्याज / Interest Expenses	1,47,84,077	1,07,79,527
43	स्क्रैप की बिक्री पर सेवा शुल्क / Service charges on sale of scrap	7,080	12,596
44	कार्यशाला व्यय / CPS Workshop expenses	22,26,749	11,99,957
45	समयपूर्व एसडीआर पर हानि / Loss on Premature SDR		7,56,380
46	यूनिवर्सिटी की फीस / University Fees	13,47,020	37,57,230
47	ऑडिट फीस / AUDIT FEES	97,500	
48	फैब्रीकेशन एवं फर्नीशिंग / Fabrication And Furnishing	13,42,338	
	कुल / TOTAL	**14,96,63,586**	**14,02,88,864**

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K.R.Bali

वित्तीय विवरण प्रपत्र (गैर-लाभकारी संगठन)
FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
संस्थान का नाम : भारतीय भूचुम्बकत्व संस्थान, न्यू पनवेल, नवी मुंबई - **410 218**
Name Of Entity : Indian Institute Of Geomagnetism, New Panvel, Navi Mumbai – 410 218.
31 मार्च 2025 तक का आय तथा व्यय विवरण के भाग की अनुसूची
SCHEDULE FORMING PART OF INCOME & EXPENDITURE FOR THE YEAR ENDED 31ST MARCH 2025

(राशि / Amount – रू./Rs.)

अनुसूची 22 : अनुदान तथा अनुवृत्ति इत्यादि पर हुआ खर्च **SCHEDULE 22 : EXPENDITURE ON GRANTS,SUBSIDIES ETC**	वर्तमान वर्ष के अंत तक / **Current Year Ended 31st March-2025**	पिछले वर्ष के अंत तक / **Previous Year Ended 31st March-2024**
a) संस्थानों / संगठनों को दिया गया अनुदान Grants given to Institutions / Organizations	5,70,000	4,00,000
b) संस्थानों तथा संगठनों को दी गई अनुवृत्ति Subsidies given to Institutions / Organizations	-	-
कुल / **TOTAL**	**5,70,000**	**4,00,000**
*(नोट : संस्थान का नाम, अनुदान / वृत्ति की दी गई राशि के साथ उनकी गतिविधियाँ बताएं / **Note : Name of the Entities, their Activities along with the amount of Grants/subsidies are to be disclosed.***		

अनुसूची / **SCHEDULE 23 : ब्याज़ / INTEREST**	वर्तमान वर्ष / **Current Year as on 31/03/2025** के अनुसार	पिछले वर्ष / **Previous Year as on 31/03/2024** के अनुसार
	0	**NIL**
कुल / **TOTAL**	**0**	**NIL**

INDIAN INSTITUTE OF GEOMAGNETISM

PLOT NO.5,SECTOR-18,
NEW PANVEL (W) NAVI MUMBAI
Maharashtra - 410218, India

Current Liabilities

Group Summary

1-Apr-24 to 31-Mar-25

Particulars	Opening Balance	Transactions		Closing Balance
		Debit	Credit	
DUTIES & TAXES	**11,72,813.78 Cr**	*3,80,01,257.00*	*3,75,35,998.00*	**7,07,554.78 Cr**
Provisions	**2,24,43,409.00 Cr**	*2,18,39,509.00*	*5,28,48,245.00*	**5,34,52,145.00 Cr**
Sundry Creditors	**1,31,02,642.00 Cr**	*96,82,11,638.02*	*95,76,01,572.42*	**24,92,576.40 Cr**
BANK GUARNTEE	**52,134.00 Cr**			**52,134.00 Cr**
DEPOSITS - WARRANTY	**21,774.00 Cr**			**21,774.00 Cr**
EPF DEPOSIT	**1,25,233.00 Cr**			**1,25,233.00 Cr**
ESIC DEPOSIT	**10,055.00 Cr**			**10,055.00 Cr**
LIBRARY / CAUTION MONEY DEPOSIT-305	**5,25,000.00 Cr**	*1,65,000.00*	*1,85,000.00*	**5,45,000.00 Cr**
PERFORMANCE GAURANTEE-304	**4,08,766.00 Cr**	*91,760.00*	*1,45,000.00*	**4,62,006.00 Cr**
SECURITY DEPOSITS-302	**9,88,822.00 Cr**	*2,31,460.00*	*1,24,002.00*	**8,81,364.00 Cr**
GENERAL PROVIDENT FUND-38		*1,65,90,280.00*	*1,65,90,280.00*	
GPF ADVANCE-RECOVERY	15,000.00 Cr	*6,56,250.00*	*6,41,250.00*	
GSLI SCHEME-37		*1,09,175.00*	*1,09,175.00*	
IIG EMP BENEVOLENT FUND -SB -12145-BOI-135	37,049.00 Cr	*4,74,686.00*	*4,59,139.00*	21,502.00 Cr
IIG EPF -SB-12146-BOI-130		*13,292.00*	*13,292.00*	
IIG-GPF-SB-12143-BOI-131		*1,70,06,530.00*	*1,70,06,530.00*	
INCOME TAX ON -PENSIONERS		*28,07,760.00*	*28,07,760.00*	
JNU REGISTRATION FEES PAYABLE	23,066.00 Cr	*2,31,095.00*	*4,78,870.00*	2,70,841.00 Cr
LIC OF INDIA -35		*1,51,146.00*	*1,51,146.00*	
MET. SOCIETY -36		*1,34,03,351.00*	*1,34,03,351.00*	
NPS RECOVERY FROM SALARY-41		*1,16,72,476.00*	*1,16,72,476.00*	
Other Current Liability	9,84,719.00 Dr	*64,046.00*		10,48,765.00 Dr
PENSION-PAYABLE		*7,28,74,588.00*	*7,28,74,588.00*	
Pro-Rata Gratuity	52,416.00 Cr			52,416.00 Cr
RECREATION AND WELFARE FUND-43		*1,19,600.00*	*1,19,600.00*	
RESEARCH SHOLAR-PAYABLE		*2,38,99,189.00*	*2,38,99,189.00*	
SALARIES PAYABLES A/C		*17,53,65,383.00*	*17,53,65,383.00*	
STAFF BENEVOLENT FUND -45		*1,78,500.00*	*1,78,500.00*	
Grand Total	**3,79,93,460.78 Cr**	***1,36,41,57,971.02***	***1,38,42,10,346.42***	**5,80,45,836.18 Cr**

JAIN GANGWAL & ASSOCIATES * CHARTERED ACCOUNTANTS * MUMBAI FRN 114382W

K.R. Salvi

Staff and students of IIG celebrating the Institute's Foundation Day with joy and enthusiasm.

Group photograph during the visit of the DST Secretary to Colaba Campus
for the inauguration of the Colaba Research Centre.

Group photograph of distinguished guests and participants at the 4th Conference on Plasma Simulations.