2025 Workshop: Ionospheric-Thermospheric Dynamics: Observations During Solar Cycle 25's Ascending Phase

Long title
Advancing our understanding of Ionospheric-Thermospheric Dynamics: Ground- and Space-Based Observations During Solar Cycle 25's Ascending Phase
Conveners
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Description

This session will address recent findings about ionospheric and thermospheric dynamics at low and middle latitudes, with focus on results obtained using observations made during the ascending phase of Solar Cycle (SC) 25. The increasing number of space- and ground-based instruments with observations of the thermosphere-ionosphere system has provided valuable new information about processes controlling the Earth's upper atmosphere. These new, advanced observational capabilities coincided with the highest solar flux in more than two decades, leading to unprecedented observations of several phenomena.Thermospheric neutral wind observations over South America have revealed significantly stronger wind velocities in the early night than those predicted by empirical models, along with smaller horizontal gradients compared to lower solar flux conditions. Similarly, higher solar flux levels have enabled electrodynamics experiments at higher altitudes and provided intriguing new observations of plasma irregularities at low and mid latitudes during geomagnetically quiet and disturbed conditions.These new observations can advance our understanding of fundamental physical processes and provide new information about the impact of the geospace environment on technological systems. This session welcomes presentations on findings related to new observations made during the ascending phase and peak of the solar cycle 25. The session also invites presentations describing and highlighting the benefit of new, recently deployed instrumentation. Finally, the session welcomes

presentations of results related to modelling efforts focused on long-term studies or during high solar flux conditions.

Agenda

- **C. Valladares :** TEC, Scintillation and TEC depletions in South America
- **E. Yizengaw :** Is PRE Drift the only Driver of Equatorial Small-scale Irregularities?
- **A. Kirchman :** Machine Learning Emulator of Regional Simulations of Equatorial Spread F at SPARTA SWx-C
- **S. Zou:** Simulations of the April 23-24, 2023 storm super plasma bubble using coupled GITM-SAMI3
- **D. Karan/C. Martinis :** GOLD Observations of Equatorial Plasma Bubbles Reaching Mid-Latitudes During the 23 April 2023 Geomagnetic Storm
- **R. Singh :** Ionospheric Responses to an Extreme (G5-Level) Geomagnetic Storm Using Multi-Instrument Measurements at the Jicamarca Radio Observatory on 10–11, 2024
- **J. Sousasantos:** Evidence of enhanced upward drifts, plasma irregularities, and strong scintillation in the early nighttime under mild substorm conditions
- **J. Chau :** Exploration of MLT mesoscales dynamics with SIMONe systems at different latitudes
- **K. Pandey:** Ionospheric Impacts of the April 2024 Total Solar Eclipse

Justification

This workshop is justified by the elevated solar flux activity of recent years and by findings associated with new observations and modeling efforts that have captured and helped better understanding these conditions.
During the ascending phase of Solar Cycle 25, the enhanced solar flux levels contributed to significant changes in thermospheric-ionospheric dynamics. This session intends to discuss how recent observational and modeling efforts have advanced our understanding of IT dynamics under these geospace conditions. The increase in instrument networks and the availability of observations from ground- and satellite-based instruments deployed over the past 20 years contribute to new findings and to uncovering mechanisms and phenomena previously unknown or thought to be absent in certain regions of the globe. This workshop will present and discuss the scientific benefits of new observations and modeling efforts focused on high solar flux conditions. Additionally, the workshop intends to contribute to discussions related to space weather monitoring, modeling and forecasting.

Related to CEDAR Science Thrusts:
Develop observational and instrumentation strategies for geospace system studies
Manage, mine, and manipulate geoscience/geospace data and models
Workshop format
Short Presentations
Keywords
Ionosphere-Thermosphere dynamics, long-term observations, thermospheric-ionospheric modeling, solar cycle 25.
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