2021 Workshop: Dynamic coupling of IT during storms

Long title
Dynamic coupling of the thermosphere-ionosphere system during geomagnetically active periods
Conveners
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Description

Earth’s coupled ionosphere-thermosphere (I-T) system is controlled by complicated chemical and physical processes that vary greatly with external driving conditions and internal dynamics. This variability becomes much stronger during storm times, when the interaction between the solar wind and geospace produces significant energy and momentum inputs to the I-T system through enhanced high-latitude convective electric fields, particle precipitation, and thus Joule heating and ion drag, changing high latitude composition, winds and temperature. These storm-time, high-latitude perturbations are then transmitted to middle and low latitudes, as well as to different heights, through non-linear dynamics and electrodynamics, such as penetration electric fields, disturbance dynamo, traveling atmosphere/ionosphere disturbances (TADs/TIDs), changing global neutral and plasma densities and producing structures of different spatial and temporal scales. Recent development of first principles models of the coupled geospace and new observations from space missions such as GOLD, ICON and COSMIC II and ground-based TEC observations provide new opportunity to explore the fundamental coupling physics in the I-T system during geomagnetically active periods and its feedback effects on the magnetospheric dynamics. This session welcomes presentations of both observations and modeling on the dynamic changes of the I-T system during storms.

Agenda

1. Phil Anderson: Impact of Ionospheric Storm Phase and TIDs on Ionospheric Bubble Formation.

2. Chaosong Huang: Ionospheric horizontal plasma drifts and thermospheric winds during a magnetic storm.

3. Dong Lin: SAPS variability under IMF By.

4. Jiang Liu: The impact of active-time magnetosphere convection on the ionosphere-thermosphere system: embedded R1/R2 FACs and dawnside auroral polarization stream

5. Ludger Scherliess: Using the Multimodel Ensemble Prediction System (MEPS) to Study Ionospheric Storms at Low- and Mid-Latitudes

6. Delores Knipp: The Roots and Ramifications of the December 2006 Prompt Penetration Events

7. Kevin Pham: TADs during storms

8. Manbharat DhaDly: High Latitude and Seasonal Impacts on Storm-time Large-scale Traveling Ionospheric/Atmospheric Disturbances (LSTID/LSTADs)

9. Yongliang Zhang: Magnetosphere and thermosphere response to the long lasting storm in March 2017

10. Xuguang Cai: Neutral composition tongue

11. Shasha Zou: Observational and modeling study of equatorial to low-latitude ionosphere-thermosphere dynamics during geomagnetic disturbances

Justification

This proposed CEDAR workshop tries to explore the fundamental coupling physics in the global I-T system during geomagnetically active periods, which is related to the CEDAR strategic Thrust #1: Encourage and Undertake a Systems Perspective to Geospace to understand global connectivities and causal relationships involving the space-atmosphere interaction region (SAIR) and to determine their influences on the interaction region and the whole Earth system. New observations including GOLD, ICON and COSMIC II and ground-based TEC observations and first principles simulations by global coupled thermosphere ionosphere models will be employed to

address the dynamic ion-neutral coupling processes during storms and the the way energy and momentum inputs at high latitudes are distributed globally and in three dimensions. The success of the workshop will be measured by the enhanced understanding of the I-T system dynamics.

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