2015 Workshop: MIT Coupling in the Polar Cap

Long title
Magnetosphere-Ionosphere-Thermosphere Coupling in the Polar Cap: Drivers and Impacts
Conveners
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Description

Magnetosphere-Ionosphere-Thermosphere Coupling in the Polar Cap: Drivers and Impacts The polar cap is a dynamic region of the geospace environment where the magnetosphere, ionosphere, and thermosphere (MIT) combine to give rise to a rich variety of interactions. For example, there is increasing evidence that energy dissipation and Joule heating of ions and neutrals occur at very high latitudes, and are not restricted to the auroral zones. Localized maxima in observed Poynting fluxes and neutral densities have been identified in the polar caps at all local times in both hemispheres during periods of high magnetic activity. These new observations radically revise the current paradigm for the MIT response to magnetic forcing by the solar wind, and may be associated with a variety of polar cap phenomena (e.g., polar cap patches, scintillation). We solicit presentations of high latitude MIT coupling during all periods of magnetic activity, as well as modeling approaches to high-latitude forcing.

Agenda

13:30 – 13:40 Ying Zou Polar cap flow channels and the nightside aurora (pdf)

13:40 – 13:50 Boyi Wang Dayside observations of polar cap flows and their association with the magnetosheath and IMF (pdf)

13:50 – 14:00 Robert Gillies Ground-based observations of polar cap arcs using REGO and RISR-N (pdf)

14:00 – 14:10 Gareth Perry Investigation of polar ionospheric dynamics with ePOP, SuperDARN and ISR (pdf)

14:10 – 14:20 Endawoke Yigengaw Small scale ionospheric density variations – gravity waves or ULF? (pdf)

14:20 – 14:30 Kevin Urban Solar Wind-Polar Cap Open Field Interactions (pdf)

14:30 – 14:40 Yue Deng Intense Poynting flux at very high latitude during magnetic storms: GITM simulation results (pdf)

14:40 – 14:50 Cheryl Huang High latitude neutral density statistics (pdf)

14:50 – 15:00 Yanshi Huang Neutral heating over the polar cap during magnetic storms (pdf)

15:00 – 15:10 John Meriwether Vertical wind dynamics at Svalbard (pdf)

15:10 – 15:15 Qian Wu Observations from Eureka and Resolute (pdf)

15:15 – 15:30 Cheryl Huang Discussion

• What observations are needed to advance study of the high-latitude region? Can we form collaborations to address the gaps?

• What modeling tools are needed to complement the observations and provide improved predictions of the coupled MIT system?

Justification

Energy flow across the boundaries between space and the atmosphere is one of the primary challenges identified in the CEDAR Strategic Plan (Sections 2.3, 2.3). The Decadal Survey also lists "Determine the dynamics and coupling of Earth’s magnetosphere, ionosphere, and atmosphere and their response to solar and terrestrial inputs" as one of its goals.

We have identified stormtime energy input into the polar regions as a new paradigm for MIT coupling. Our workshop will bring together observations of polar cap energy dissipation from ground and space, challenging the theory and modeling community to come up with new approaches to uncover the basic scientific processes taking place.

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