2021 Workshop: IT asymmetries

Long title
Interhemispheric IT asymmetries and their causes and effects
Conveners
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Description

In this workshop we will bring together researchers focusing on the MI coupling, IT system, and MLT dynamics to discuss the questions, challenges, and causes of interhemispheric difference effects in the IT system and if a system approach is necessary to understand and capture observed asymmetries.

The workshop will be guided by the following questions

How large are interhemispheric asymmetries in the MI coupling during quiescent and disturbed conditions and what contributes to the asymmetries?

Are interhemispheric differences in the MI coupling important to consider during quiescent times to capture the middle and low latitude IT variations?

How does the coupling to the lower atmosphere influence the high latitude regions and are there interhemispheric differences?

What is the importance of the coupling of the IT system to the lower atmosphere during quiet solar wind and disturbed conditions?

The workshop solicits input about

a: Studies considering the forcing from the lower atmosphere and the MI coupling and their IT effect for quiescent and disturbed conditions.

b. Characterize interhemispheric differences in MI coupling and MLT dynamics and their large and mesoscale IT effects

c. Characterize interhemispheric differences in the IT system on large and mesoscales and their probable causes based on observations and models for quiescent and disturbed conditions.

Agenda

Delores Knipp - DMSP Poynting flux and interhemispheric asymmetries

John Coxon - The interhemispheric asymmetry in Birkeland currents

Sarah Vines - Probing Interhemispheric Asymmetries in the Birkeland Currents with AMPERE

Yining Shi - Interhemispheric asymmetries in magnetic field residual between Swarm observations and IGRF model

Qingyu Zhu - Impact of high-latitude electrodynamical forcing on the ionosphere and thermosphere system: GITM simulation

Yu Hong - Impacts of the inter-hemispheric asymmetries of Field-Aligned Current on the I-T system: GITM-3Dynamo simulations

Clara Narvaez & Michael Mendillo - Ionospheric storms at interhemispheric geophysically equivalent sites

Marc Hairston - Hemispheric asymmetry and local time variance of the penetration electric field during the 2013 St. Patrick’s Day storm

Sharon Vadas - GW sources differences in the wintertime high-latitude northern and southern hemispheres

Richard Collins - Wave-Driven Asymmetries in the Ionosphere-Thermosphere due to Asymmetries in the Northern and Southern Polar Vortices

Justification

This workshop focuses on quantifying interhemispheric differences observed in the ionosphere-thermosphere (IT) system and understanding their causes. Interhemispheric differences are observed in the high latitude magnetosphere-ionosphere (MI) coupling which affects not only the high latitude region but also

middle and low latitudes. In addition, it is well known that the IT system is influenced by upward propagating atmospheric tides, planetary waves, and gravity waves, which can possess interhemispheric differences. Asymmetry can also arise intrinsically from the differences in the behavior of the plasma and neutral gases that are related to season, the variations of Earth's magnetic field strength and direction, and the effect of ion-neutral coupling.

While we often tend to separately study the effects from the MI coupling and the effects from the lower atmosphere on the IT system, we are now in a better position than ever before that the available observations and numerical modeling capabilities allow us to consider both aspects and investigate the connections between them in a systematic approach.

In this workshop we will bring together researchers focusing on the MI coupling, IT system, and MLT dynamics to discuss the questions and causes of effects of interhemispheric differences in the IT system and if a system approach is necessary to understand and capture observed asymmetries. The workshop is well aligned with the CEDAR strategic Thrust #1: "Encourage and undertake a systems perspective of Geospace"

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