2016 Workshop: Particle Precipitation

Long title
Particle Precipitation and the Effects on Earth's Atmosphere
CEDAR-GEM
Conveners
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Description

The precipitation of energetic particles is a major magnetosphere-ionosphere pathway which has implications for atmospheric chemistry. However, quantifying this process and the amount of precipiation to the upper atmosphere remains difficult to because of the requirement of conjugate magnetospheric and ionospheric observations. Increased ionization of the F, E, and D regions of the ionosphere have important implications for driving gravity waves, enhancing ionospheric conductivity, as well as the production and transport of NOx and HOx, which can have important consequences for terrestrial climate. Both the GEM and CEDAR communities, as well as the larger geophysics community, are interested in quantifying and understanding the loss of magnetospheric and solar particles to the upper atmosphere.

There are large gaps in our understanding of processes that span the disciplines of both the GEM and CEDAR groups. In this joint session we hope to bring together researchers from both communities to share expertise. This expertise will develop a better understanding of the underlying physics of particle loss, to show observations of loss into the atmosphere for the purpose of predicting, and describe the occurrence variability, flux, region of loss, and energy spectra of precipitation loss to the upper atmosphere. We seek short and focused presentations on the ionospheric and atmospheric response from magnetospheric particle loss, the importance of the processes generating this loss in the coupled magnetosphere-ionosphere system and outstanding questions regarding energetic particle loss.

Justification

Understanding the effects of particle precipitation into the upper atmosphere is of interest to both the GEM and CEDAR communities as well as the wider Heliospheric community making this topic ideal for a joint GEM-CEDAR session. Specifically, understanding the dynamics of the loss of magnetospheric particle populations including radiation belt electrons, plasma sheet ions and electrons and ring current plasma, to the atmopshere is relevant to the following GEM focus groups: Quantitative Assessment of Radiation Belt Modeling, Geospace Systems Science, Tail-inner Magnetosphere Interactions, and to the following CEDAR strategic Thrusts: Encourage and Undertake a Systems Perspective to Geospace, Explore Exchange Processes at Interfaces and Boundaries, and Fuse the Knowledge Base across Disciplines. Understanding the Atmosphere-Ionosphere-Magnetosphere System Response and variability is also highlighted in the Decadal Survey for Solar and Space Physics. Additionally, this topic is emphasized in the new National Space Weather Strategy and Action Plan.

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