2025 Workshop: CEDAR/RB-SoS

Long title
Effects of radiation belt particle precipitation on the atmosphere
CEDAR-GEM
Conveners
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Description

Energetic electron precipitation (EEP) is one of the key loss processes responsible for depletion of the radiation belts and is an important source of energy and ionization for Earth's atmosphere. Precipitation from the radiation belts into the atmosphere changes the chemical composition from the stratosphere to the mesosphere and lower thermosphere. By dissociation, dissociative ionization, and ionization of major atmospheric species, EEP changes atmospheric nitric oxides (NOx) and hydrogen oxides (HOx), which serve as a reaction catalyst for large ozone (O3) loss in the stratosphere and mesosphere. By changing the composition of the atmosphere, EEP can also indirectly affect the heating and cooling rates in the atmosphere and thus its dynamics. A comprehensive understanding of EEP characteristics and its influence on the atmosphere remains elusive because it requires a synergistic characterization of both radiation belt dynamics and atmospheric responses

In this session we will cover how EEP of radiation belt particles affects the atmospheric system, in terms of energy input, transport processes in the atmosphere, as well as the direct and indirect effects on the atmospheric chemistry and dynamics. We will encourage talks that address the inputs to the system and make progress in atmospheric modeling including the EEP effects.

Agenda

Speaker schedule is listed on the RB-SoS GEM wiki:
https://gem.epss.ucla.edu/mediawiki/index.php/FG:_Radiation_Belts_as_a_System_of_Systems

Zoom Link for Virtual Attendees:

https://jhuapl.zoomgov.com/j/1602677396?pwd=Zv4V7w27PextIlnMAkZnCudaWhgb07.1

Meeting ID: 160 267 7396
Password: 724591

Justification

Understanding the radiation belt sources and the resulting atmospheric effects (regional vs global, short- vs. long-lived, dependence on altitude, etc.) is essential to understand how the RB system couples with the atmosphere as a whole. This session will also be fundamental to start a conversation between the CEDAR and GEM communities. We will encourage attendees to share resources (data, models, etc.) and foster collaborations.

Related to CEDAR Science Thrusts:
Encourage and undertake a systems perspective of geospace
Explore exchange processes at boundaries and transitions in geospace
Explore processes related to geospace evolution
Fuse the knowledge base across disciplines in the geosciences
Manage, mine, and manipulate geoscience/geospace data and models
Workshop format
Short Presentations
Keywords
Energetic electron precipitation, atmospheric dynamics, atmospheric chemistry, radiation belts
Focus Group and Group Leader

Focus Group: RB-SoS (FG Leader: Harriet George)
CEDAR Leader: Hanli Liu

List GEM Focus Groups (if any) you wish to avoid being in concurrent sessions with (due to overlapping research interests)

MPEC - Magnetospheric Sources of Particle Precipitation and Their Role on Electrodynamic Coupling of Magnetosphere-Ionosphere-Thermosphere Systems
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