2025 Workshop: Platform for collaborative research among modelers and data scientists

Long title
Innovative applications of atmosphere-ionosphere models and datasets
CEDAR Regular Workshop
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Description

Modeling efforts and observational analyses are inseparable parts of atmosphere-ionosphere studies. It is common for modelers to validate their model results against observational evidence, while data analysts seek help from first-principles models to interpret measurements and the underlying physical processes. However, due to insufficient communication, researchers in their respective fields may sometimes miss contemporary advances outside their area of expertise. For example, a data synthesis method originally developed for rainfall distribution might serve as a useful tool for auroral data assimilation. Additionally, local refinement of numerical models lays the foundation for one-to-one comparisons with local ground-based and space-borne observations. These topics are not limited to multi-scale processes in the atmosphere-ionosphere system but can also include coupling processes (top-down and bottom-up) and both long-term and short-term variations. This session will feature short presentations and open discussions, providing an engaging environment for modelers and data scientists to introduce and promote their methodologies and data products . At the same time, new collaborations may be fostered around specific scientific topics. Graduate students and early-career scientists are highly encouraged to present their work in this session.

Justification

Science advances through communication and collaboration. Typically, we seek potential collaborations when faced with specific scientific questions. However, with the growth of various models and the accumulation of massive data over the past few decades, effectively and efficiently pinpointing the correct model(s) or dataset has become an increasingly important task in scientific research. For example, distributed ground-based instruments like the Fabry-Perot Interferometer provide valuable thermospheric wind measurements. Yet, modelers may be unaware of these data sources, missing the opportunity to use them for model validation. In this session, we aim to provide a platform for researchers to share their state-of-the-art models and newly calibrated datasets, enabling participants to be more informed and more easily achieve their targeted scientific objectives.
On the other hand, researchers sometimes fail to realize that their work can have an even greater impact on others' research. Often, a "side product", such as a simple model developed to study a specific physical process or a methodology used to analyze a particular dataset, becomes a powerful tool for studying other atmosphere-ionosphere processes or serves as a general strategy to analyze various types of data. As another well-known example, ensemble data assimilation was initially introduced to better constrain the initial conditions for weather forecast models. Today, it has become the de facto standard approach for assimilating physical models in the atmosphere-ionosphere system. In this session, we will focus on promoting models, methodologies, and datasets, regardless of whether they are tied to specific scientific questions, allowing participants the freedom to apply them to various scientific tasks.

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