2026 Workshop: Data integration in predictive systems

Long title
New frontiers in the integration of upper atmosphere wind observations with global general circulation models
Conveners
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Description

The upper mesosphere and lower thermosphere (UMLT) are part of the Earth’s atmosphere where space and terrestrial weather meet. Only a few and sparse observations are available in this region where General Circulation Model (GCM) reveal many biases. An emerging class of observations that are being integrated in GCMs are UMLT winds, which include meteor radar (MR) observations and spaceborne observations. The quality of these observations has been vastly demonstrated but their integrations in GCM remains challenging. Beyond (and inclusive of) conventional data assimilation, new technology is also being developed using machine learning to enable such integration. A hurdle to overcome is data homogeneity across different domains and collaboration between modelers and observationalists is essential: observations benchmark models, while models help interpret sparse or noisy measurements. We invite short presentations that address the possibilities, challenges and benefits of using UMLT wind observations in combination with GCMs.

Agenda

Preliminary:

Chih-Ting Hsu (NCAR/HAO): **TBD**

Hui Shao (NRL): Overview of Navy's future ionospheric/thermospheric DA

Wenjun Dong (GATS): Coupling of gravity waves and semidiurnal tides over the Andes using metero radar observations and high-resolution simulations

Guiping Liu (GSFC): Mesoscale gravity waves in the GEOS-FP mesosphere: a case study

Manbharat Dhadly: ICON/MIGHTI and TIMED/SABER: A Multi-Year Statistical Comparison at Conjunctions in the Lower Thermosphere

[AWE TBD]

Justification

The goal of this workshop is to stimulate discussions between modelers and observationalists on their data needs, how data is used and obtained. Without constraints, the scope of such workshop would be too broad and unattainable; thus, we limited the scope to neutral wind observations in the upper atmosphere and lower thermosphere. Wind observations in this atmospheric region are going to be critically important for predictions and to understand the underlying physical coupling between atmospheric layers.
This workshop is also aligned with the new SCOSTEP Focus Area #3 under COURSE (Cross-scale coupling processes in the solar–terrestrial system, more specifically with the working group on Data integration for Atmospheric Linkage (DIAL), of which Dr. Sassi is a co-lead. Many datasets exist from ground-based observations to spaceborne, all with their own properties and deficiencies. Some are included in empirical models like MSIS and IRI, and NASA reanalysis products. This workshop intends to address the inhomogeneity of extensive ground-based networks such as ionosondes, HF radars, and GNSS receivers. Reviewing these resources, their accessibility and availability for use can clarify their strengths, limitations, and gaps in coverage or accessibility.

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Workshop format
Short Presentations
Keywords
mesosphere, lower thermosphere, neutral winds
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