2019 Workshop: Energy Budget of the Upper Atmosphere

Long title
Observational and Modeling Challenges in the Energy Budget Estimation of the Upper Atmosphere
Conveners
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Description

The overall thermal and compositional structure of the upper atmosphere is determined by the competition between the heating and cooling processes. A full understanding of the upper atmosphere energetics is crucial for interpreting and forecasting the variability of the upper atmosphere in response to the forcing from both above and below. Observational and modeling studies have been advancing our knowledge of the upper atmospheric energy budget, but challenges still remain, such as uncertainties in the solar and geomagnetic energy inputs, energy dissipation in the upper atmosphere by the waves from below, and data-model discrepancies in the infrared cooling rates. We invite short presentations discussing the current understanding of the upper atmospheric energy budget, observational and modeling effort targeting on the challenges mentioned above, as well as other related topics.

Agenda

16:00-16:15, **Hanli Liu**, Impacts of Gravity Waves on the Thermosphere and Ionosphere

16:15-16:30, **Cissi Lin**, Nitric Oxide and Gravity Waves in Climatological Global Energy Budget During the Recent Solar Cycles

16:30-16:45, **Delores Knipp**, Highlights of upper atmosphere energy budget and distribution sensed at low earth orbit via TIMED and DMSP missions

16:45-17:00, **Linda Hunt**, Energy Budget of the Mesosphere and Lower Thermosphere from SABER Observations (pdf)

17:00-17:15, **Yongliang Zhang**, Storm-time variations of NO column density and NO 5.3 um radiance

17:15-17:30, **Gang Lu**, Impact of High-latitude Energy Inputs on the Ionosphere-Thermosphere System

17:30-17:45, **Dan Weimer**, The rise and fall of thermospheric temperatures

17:45-18:00, **Cheng Sheng**, Effects of Alignment Between Particle Precipitation and Ion Convection Patterns on Joule Heatin

Justification

We intend to bring observational and modeling studies together in this session to seek the current understanding of the upper atmospheric energy budget, with an objective to better understand and forecast the variability of the ionosphere and thermosphere on various temporal and spatial scales. This session will address Strategic Thrust #1 (Encourage and Undertake a Systems Perspective to Geospace) and Strategic Thrust #3 (Explore Processes Related to Geospace Evolution) of the CEDAR Strategic Plan as well as the Decadal Survey for Solar and Space Physics (The consequences of solar variability on the atmospheres and surfaces of other bodies in solar system, and the physics associated with the magnetospheres, ionospheres, thermospheres, mesospheres, and upper atmospheres of the Earth and other solar system bodies). This session will also address A. Fundamental Scientific Understanding (iii. How mass, energy, and momentum are transported through the heliosphere, magnetosphere, ionosphere, and atmosphere) and B. Linking Science with Societal Needs (i. a robust systems approach to understanding and predicting space weather; ii. Development of large-scale, global space environment models suitable for space weather specification and forecasting) of the 2013 NSF Geospace Science Plan.

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