# 2016 Workshop: Heating and cooling in thermosphere

Long title
Variations in the thermosphere: heating and cooling impacts
Conveners
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Description

The thermospheric conditions (temperature, density and composition) depend on heating and cooling and their history. It is well known that (1) the heating sources include solar EUV flux and Joule/ particle heating, and energy from the lower atmosphere; (2) the cooling processes include infrared radiation (e.g. from nitric oxide and carbon dioxide), downward heat conduction, adiabatic cooling, and neutral wind. However, the competition among the heating and cooling processes and their impacts are not well understood. We welcome short presentations on the heating and cooling studies over different time scales, storm-time (hours to days), season, solar cycle and long term trend based on either data analysis or modeling studies.

Agenda

08:00 - 08:10 **Shunrong Zhang**, Ionospheric Friction Heating Associated with SAPS

08:10 - 08:20 **Gang Lu**, High-latitude energy input and its impact on thermospheric composition

08:20 - 08:30 **Daniel C. Bowman and Jonathan M. Lees**, Capturing acoustic energy input into the upper atmosphere using free flying sensor arrays

08:30 - 08:40 **Ja Soon Shim, Masha Kuznetsova, and Emine C Kalafatoglu**, Quantification and validation of neutral density variations during geomagnetic storm

08:40 - 08:50 **Titus Yuan**, Impacts of CME Induced Geomagnetic Storms on the Mid-latitude Mesosphere and Lower Thermosphere Observed by a Sodium Lidar and TIMED/GUVI

008:50 - 09:00 **Marty Mlynczak** (presented by Delores Knipp), Variations of NO and CO2 cooling in the thermosphere over the last 70 years

09:00 - 09:10 **Delores Knipp**, A superposed epoch analysis of thermosphere nitric oxide response to solar wind shocks and magnetic clouds: SABER view

09:10 - 09:20 **Chaosong Huang**, Characteristics of disturbance dynamo processes in the nighttime equatorial ionosphere during the March 2015 magnetic storm

09:20 - 09:30 **Vicki Hsu**, Heating and cooling in the upper thermosphere through drag mechanisms

09:30 - 09:40 **Cheng Sheng**, The thermospheric recovery during the April 5, 2010 storm

09:40 - 09:50 **Cissi Y. Lin, Yue Deng, Karthik Venkataramani, Justin Yonker, Scott Bailey**, Nitric Oxide in the Energy Budget of the Thermosphere

09:50 -10:00 **Yongliang Zhang**, and Larry Paxton, Storm-time thermospheric compositions from TIMED/GUVI

Justification

The proposed session aims to address the science questions on the global thermospheric variations due to competition among heating and cooling processes. This directly supports the 2011 CEDAR strategic plan that calls for studies of a systematic perspective of geospace.

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