2017 Workshop: Ionosphere and thermosphere storm

Long title
Ionosphere and Thermosphere Response to CIR- and ICME-driven Storms
Conveners
Jing Liu
Shunrong Zhang
Wenbin Wang
Description

The ionosphere and thermosphere variations during geomagnetically active periods are mainly driven by energy and momentum dissipation from the magnetosphere and solar wind at high latitudes. The two major categories of interplanetary solar winds that are geoeffective are Interplanetary Coronal Mass Ejections (ICME) and Corotating Interaction Regions (CIR). ICME and CIR have distinct characteristics. ICMEs usually have a larger steady southward Bz component, whereas CIRs have highly variable Bz which fluctuates rapidly between north and south and lasts for several days. The commonality and difference in CIR- and ICME-induced thermospheric and ionospheric variations, such as their global structure, the disturbance propagation timing, and recovery, are still an open question. It is still interesting and challenging to understand how the thermosphere and ionosphere respond to the impulsive and strong driving from ICMEs and the weak or moderate, but almost constant energy dissipation for a long period of time during CIR events. We welcome presentations of both observations and numerical simulations of the storm-time changes of the thermosphere and ionosphere during ICME, CIR, and ICME+CIR storm events and the recovery of the thermosphere and ionosphere after these storms. Our session is interested in particularly recent storm events where coordinated observational campaigns have been conducted to characterize some of the key ionosphere/thermosphere parameters (such as electric fields, neutral winds and composition). These include, but not limited to, March 31-April 4, 2014; Sept 24-29, 2014; March 13-18, 2015; Sept 28-29; 2016 (all CIR storms); and March 17-19; 2013/2015 (St Patrick’ Days), and Oct 13-14, 2016 (ICME storms).

Agenda

Cesar Valladares UTD The magnetic storms of August 3-4, 2010 and August 5-6, 2011: Ground and space-based observations

Joe Huba NRL SAMI3/RCM modeling of storm effects on the ionosphere

Xiaoqing Pi JPL Storm study using the Global Assimilative Ionospheric model

Wenbin Wang HAO TBD

Tony Mannucci JPL IT driving by interplanetary structures and energy budget modeling

Shunrong Zhang MIT The long-lasting Storm Enhanced Density (SED) plume during the St Patrick's Day storm in 2015

Asti Bhatt SRI Memorial Day storm

Justification

The response of upper atmosphere to geomagnetic storms either driven by CIR, ICME or both is an important topic for space weather research, which is still poorly understood and not well quantified. The recent advances in theoretical simulations of the coupled magnetosphere-ionosphere-thermosphere system, data assimilation technique and new satellite mission made it possible to improve our understanding of the common and different response of the earth upper atmosphere to geomagnetic storms. It supports CEDAR Strategic Thrusts #2.

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