Space Physics Seminar

Thursday, February 8, 2018

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Ionosphere-Thermosphere coupling processes associated with Subauroral Polarization Streams (SAPS)

Subauroral Polarization Streams (SAPS) are predominate features of geomagnetic storms. These features are identified as intense northward electric field driving sunward plasma convection, and are mostly observed at the dusk-premidnight subauroral region. Their formation is associated with the closure of region 2 field-aligned current (R2 FAC) through the low conductivity region equatorward of the electron equatorward boundary. Most of the studies so far have focused on the magnetosphere-ionosphere (M-I) coupling process of SAPS. However, recent observation of subauroral neutral wind suggest that there is a strong interaction between SAPS and the thermosphere (T).

In this study, we focus on the effect of thermospheric wind on the ionosphere plasma drift associated with SAPS during the March 17, 2013 “St. Patrick's day” geomagnetic storm.

We use both observations and the self-consistent magnetosphere-ionosphere-thermosphere (M-I-T) numerical “RCM-CTIPe” model to study such a relation. Observation results from DMSP-18 and GOCE satellites show that as the storm progresses, sunward ion flows intensify and move equatorward, and are accompanied by strengthening of subauroral neutral winds with a 2-hour delay. Our model successfully reproduces time evolution of the sunward ion drift and neutral wind. However, the simulated ion drift spreads considerably wider in latitude than the observations. To seek for better agreement between the observation and simulation results, we adopt a conductance distribution more consistent with input from the magnetosphere based on RCM aurora precipitation. We also perform a force term analysis to investigate the rate of momentum transfer from the neutral wind to ion flow.

4:00pm in CAS 502. *Refreshments to follow in CAS 500.*

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Next Week

Les Johnson

NASA MSFC