BOSTON UNIVERSITY

Boston University College of Arts & Sciences
Center for Space Physics

2023—2024 SPACE PHYSICS SEMINAR SERIES

Impact of Stormtime Meridional Winds on the Development of Equatorial Plasma Bubbles

We report results from a global simulation of the September 2017 geomagnetic storm. The global model comprises the ionospheric code SAMI3 and the atmosphere/thermosphere code WACCM-X. We show that a train of large-scale EPBs form in the Pacific sector during the recovery phase of the storm on September 8, 2017. However, we first discuss results from a simulation study in which a large-scale equatorial plasma bubble (EPB) forms during a midnight temperature maximum (MTM) to highlight the physics associated with meridional winds. We consider solar minimum conditions for the month of August and show that an EPB forms during an MTM in the Pacific sector and is caused by equatorward neutral wind flows. Although this is consistent with the theoretical result that a meridional neutral wind (V) with a negative gradient ($\partial V/\partial\theta < 0$) is a destabilizing influence (where a northward meridional neutral wind V is positive and θ is the latitude and increases in the northward direction), we find that the primary cause of the EPB is the large decrease in the Pedersen conductance caused by the equatorward winds. In the case of the September 2017 storm, the stormtime meridional winds are very large (⍰ 200 m/s) which leads to the generation of EPBs that rise to very high altitudes (⍰ 3500 km).

Thursday, November 30th

4:00-5:00 p.m.

725 Commonwealth Ave | Room 502

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Syntek Technologies