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SA-004: Anomalies and Disturbances in the Midlatitude Ionosphere

Mid-latitude Ionospheric Disturbances Due to Geomagnetic Storms at ISS Altitudes

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Spacecraft charging of the International Space Station (ISS) is dominated by the interaction of the high voltage US solar arrays with the F2-region ionospheric plasma environment. We are working to fully understand the charging behavior of the ISS solar arrays and determine how well future charging behavior can be predicted from in-situ measurements of plasma density and temperature. One aspect of this work is a need to characterize the magnitude of electron density and temperature variations that may be encountered at ISS orbital altitudes (~400 km), the latitudes over which they occur, and the time periods for which the disturbances persist. We will present preliminary results from a study of ionospheric disturbances in the "mid-latitude" region defined as the ~30 degree to ~60 degree extra-equatorial magnetic latitudes sampled by ISS. The study is focused on geomagnetic storm periods because they are well known drivers for disturbances in the high-latitude and mid-latitude ionospheric plasma. Changes in the F2 peak electron density obtained from ground based ionosonde records are compared to in-situ electron density and temperature measurements from the CHAMP and ISS spacecraft at altitudes near, or above, the F2 peak. Results from a number of geomagnetic storms will be presented and their potential impact on ISS charging will be discussed.