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Applications of a new low-latitude ionospheric electrodynamics model

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This presentation discusses the results of two applications of a new model for low-latitude ionospheric electrodynamics that was recently developed for the purpose of Data Interpretation and Numerical Analysis of ionospheric Missions and Observations (DINAMO). The model describes the distribution of the electrostatic potential and the associated **E**x**B** plasma drifts at the magnetic equator by solving the two-dimensional flux tube integrated dynamo equation with user-specified inputs for the state of the ionosphere and thermosphere.

The first application analyzes F-region **E**x**B** plasma drifts that are predicted by DINAMO when using common climatological models (IRI2016, NRLMSISE-00, and HWM14) to specify the ionosphere-thermosphere system. Results are compared against long-term mean observations of the drifts made by the Jicamarca incoherent scatter radar for different seasons and solar flux conditions. Results show that many features of the drifts, including their diurnal, seasonal, solar activity, and altitudinal variability, can be reproduced when using these climatological models as drivers. We also highlight and explain some model-observation discrepancies that were found. For instance, abnormal nighttime F-region vertical drifts that are predicted by the model during low solar activity can be attributed to poor specification of the E-region neutral wind dynamo.

The second application analyzes the relative importance of the integrated meridional currents to the overall morphology of the low-latitude zonal plasma drifts during equinox high solar flux conditions. This is done using a simple analytic representation of the zonal drifts that is commonly used to interpret observations.