

# Model Development for the Next Generation Ionosphere and Plasmasphere Forecasting

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The Ionosphere-Plasmasphere-Electrodynamics (IPE) model is a new, time dependent, 3-D model of ionosphere and plasmasphere recently developed through collaboration between University of Colorado, George Mason University, NOAA Space Weather Prediction Center (SWPC), NOAA Global Systems Division (GSD), and NCAR High Altitude Observatory (HAO). It provides time dependent, global, three-dimensional plasma densities for nine ion species, electron and ion temperatures, and both parallel and perpendicular velocities of the ionosphere and plasmasphere. IPE is capable of producing the climatology of global total electron content (TEC) as well as the storm-time responses in the system, such as Storm Enhanced Density (SED). Driving the IPE with the Whole Atmosphere Model (WAM), an extended version of Global Forecast System (GFS), ionospheric change associated with large scale meteorological events (such as Sudden Stratospheric Warming) and day-to-day varying thermospheric tides can be captured. The WAM and IPE model are currently coupled through using the Earth System Modeling Framework (ESMF) and the one-way coupled WAM-IPE is scheduled to be in operation in NOAA SWPC in fall 2017. In this presentation, an overview of the WAM-IPE model development and its current status will be presented. Furthermore, the preliminary results from several research projects associated with the coupled WAM-IPE model will be discussed.

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