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Poster
The Space Weather Modeling Framework (SWMF) Geospace configuration has been in operational use at the Space Weather Prediction Center (SWPC) since October 2016. A known shortcoming is its ability to produce highly accurate electrojet predictions. The prediction of the auroras remains a unique challenge in ideal magnetohydrodynamics (MHD) models, as auroral precipitation is primarily a kinetic process that MHD cannot represent. Geospace uses an empirical auroral model that relates field aligned current strength to conductance to bypass this issue, which creates wide bands of conductance with gaps around changes of current direction. This poster presents an updated version of the Geospace configuration that uses new physics in each physical domain of the simulation. The Block Adaptive Tree Solar-wind Roe Upwind Scheme (BATS-R-US) uses anisotropic MHD when solving the solar wind and global magnetosphere, and is coupled with the fully kinetic Comprehensive Inner Magnetosphere Ionosphere (CIMI) model. CIMI's kinetic physics allow for the calculation of self-consistent diffuse auroral precipitation, which is combined with field aligned currents from BATS-R-US to create the most advanced auroral precipitation predictions ever for a fully operation ready model. Using the new configuration, Geospace can now accurately model the expansion and recovery of the auroras during geomagnetic storms and substorms. The ground magnetic disturbances (GMDs) driven by auroral conductance are improved in timing, location, and magnitude when compared to the current operational Geospace version. This poster highlights the improved accuracy of space weather predictions through comparisons to the current Geospace configuration run operationally at SWPC.
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