Recent Progress in Space Weather Modeling and Forecasting at NOAA's Space Weather Prediction Center

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We discuss the current state of the art of space weather modeling and forecasting at the NOAA Space Weather Prediction Center (SWPC) in Boulder, Colorado. Recent progress in modeling the solar wind using a data assimilative flux transport model (ADAPT) from the Air Force Research Laboratory (AFRL) has shown that incorporating current and modeled solar magnetic field data results in a better correlation with measurements of the solar wind at the ACE spacecraft in L1 orbit. SWPC is also transitioning the University of Michigan's "Geospace" model to operations, enabling 15-30 minute forecasts of geomagnetic storming and regional K-value predictions. In addition SWPC and the University of Colorado Cooperative Institute for Research in the Environmental Sciences (CIRES) are developing the Whole Atmosphere Model (WAM) and the Ionosphere Plasmasphere Electrodynamics (IPE) coupled system to enable three-day forecasts of ionospheric conditions as well as neutral atmosphere density for satellite drag calculations. In accordance with the new National Space Weather Strategy released by the White House in October 2014, these and other models and products will be integrated into the Space Weather Forecast Office to enable SWPC forecasters to deliver impact-based decision support services to satellite operators, commercial airlines, GNSS users, and electrical grid operators to protect critical infrastructure from the threat of extreme space weather events.