ABSTRACT

Forecast Performance Assessment of a Kinematic and a Magnetohydrodynamic Solar Wind Model

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Assessing the forecast performance of operational models provides information to forecasters on how they should use model output as guidance. It also provides feedback to model authors on the strengths and weaknesses of their models, as well as to users of model output as forcing data for their own modeling efforts. This study is the second in a series in the Space Weather Forecasting Laboratory Pathfinder Project “Solar Wind Prediction Model Validation.” In the current effort, two operational solar wind models, Enlil and Wang-Sheeley-Arge (WSA), were executed daily for all dates of 2007-2011 in which 00 UTC grids of the magnetic field of the solar photosphere were available as compiled from the National Solar Observatory’s Global Oscillation Network Group (GONG) telescope system. The original magnetic field specification and a zero-point corrected version were used as inner boundary conditions in separate sets of model executions. The Enlil and WSA seven-day forecasts of solar wind radial speed and interplanetary magnetic field (IMF) polarity (outward or inward directed) were compared with observations from the Advanced Composition Explorer satellite at the L1 point sunward from Earth. Statistical metrics of forecast verification were computed separately by forecast day, year, and uncorrected or corrected inner boundary conditions for both models. In addition, high speed events (HSEs) and IMF polarity changes (IPCs) predicted and occurring in the seven-day forecast periods were compared. A summary of the verification metrics and comparison evaluation of the HSEs and IPCs will be presented.