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Helio Weather: Development of the Integrated Real-Time Modeling System for Heliospheric Space Weather Forecasting

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We developed the WSA-ENLIL-Cone modeling system that enables faster-than-real time simulations of corotating and transient heliospheric disturbances. This "hybrid" system does not simulate origin of coronal mass ejections (CMEs) but uses appearance in coronagraphs, fits geometric/kinematic parameters and launches a CME-like structure into the solar wind computed using WSA coronal model. This modeling system is implemented at NASA based multi-agency Community Coordinated Modeling Center (CCMC) to provide Run-on-Request service to community, and it is the first numerical model transitioned into operation at NOAA/Space Weather Prediction Center (SWPC) and NASA Space Weather Research Center (SWRC). In this presentation we introduce the Helio Weather project which aims to develop a "next generation" system. We overview recent progress on improving the solar wind and CME initialization, predicting gradual solar-energetic particles (SEPs) events, and increasing the predictive accuracy by comparing various simulated scenarios with remote heliospheric observations. This work is supported by the NASA and NSF Living With a Star's Strategic Capabilities (LWS-SC) program.