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DATA-DRIVEN MODELING OF SOLAR CORONA/Inner heliosphere BY A New 3D MHD MODEL

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In this talk, the evolution of solar wind from the solar surface to the Earth's orbit during Year 2008 is simulated by a new three-dimensional (3D) magnetohydrodynamic (MHD) solar wind model. The time-dependent projected characteristic equations are used to updates the inner boundary conditions with high-cadence observed photospheric magnetic field data as input. The simulation results are analyzed and quantitatively evaluated by comparing model output with remote-sensing observation of the corona and in-situ observation at the Sun-Earth L1 point. The analysis demonstrates that our model reproduces the main pattern and the evolutionary feature of large scale coronal structures, including the shapes and distributions of the coronal holes, and the positions and shapes of helmet streamer and pseudostreamers. From the simulation result, we find that the height of the pseudostreamer X point is positively correlated with the distance of the coronal holes connected by the pseudostreamer. During Year 2008, the helmet streamer belt is found to have a net southward displacement from the equator while the pseudostreamer belts are biased to the northern hemisphere. Both helmet streamer belt and pseudostreamer belts exhibit a general trend of flattening towards the equator during most time of the year. The evaluation of the modeled results at L1 point shows that the general structures can be generated by the model, and the speed is the best among the solar wind parameters reproduced. However, the temperature of the fast solar wind and the magnitude of interplanetary magnetic field are underestimated. The success rate of prediction and arrival time error are also calculated for magnetic field polarity reversals and stream interaction regions.