
HelioCast: A white light constrained MHD model for space weather forecast of the heliosphere

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Résumé

Space weather operations and predictions rely on fast and inexpensive models of the solar corona derived from remote observations. They are usually based on photospheric measurements of the solar magnetic field. However, a precise description of all coronal physical processes needs a very large amount of computing power, notwithstanding the many uncertainties on solar magnetograms. In recent months, we have developed a new method to derive empirically coronal properties through the identification and the localization of the heliospheric current using white light observations. Wind velocities, magnetic field, and densities are derived at 0.1 AU and then propagated up to 1 AU with a 3D MHD model. In this talk, we present this novel method and its results in nowcasting and forecasting of the solar wind plasma parameters at 1 AU. We compare this novel method with more comprehensive models for the coronal region: Multi-VP, which is a multiple 1D MHD model using a PFSS extrapolation for the magnetic field, and WindPredict-AW, a full 3D MHD model of the corona including the physics of Alfvén waves turbulence and dissipation. Finally, we inject a CME through the three different boundary conditions and compare the propagation and in situ data with in situ measurements.

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