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Poster

The Wang-Sheeley-Arge (WSA) model is widely used within the heliophysics community. It can be used to determine the location of open flux regions on the photosphere, provide inner boundary conditions for heliospheric models, forecast solar wind speed and IMF polarity, and/or determine the coronal sources of solar wind observed in situ. Given its wide acceptance, fairly simple physics, and low computational cost, multiple versions of the model exist. Here we present the results of a detailed comparison between two such models: the CORona-HELiosphere (CORHEL) WSA implementation based on the POT3D numerical magnetic field solver, and the traditional WSA model code that makes use of spherical harmonics. While the two codes solve the same problem, multiple small differences exist in the implementations which we describe. To understand the impact of these small differences, we compare the asymptotic solar wind speeds and magnetic field at the outer boundaries of the two models, the separation between the footpoints of their magnetic field lines, and the locations of open flux at the photosphere. While the differences are usually quite small, there are some conditions where the WSA empirical equation for solar wind speed is quite sensitive and produce large differences in the asymptotic wind speed, or where small differences in the position of the magnetic neutral line result in dramatic differences in magnetic field footpoint locations. Finally, we compare the differences between these two models to the variability of the models themselves in the presence of small perturbations in the model parameters.

Poster category:

Poster category
Solar and Interplanetary Research and Applications
Poster session day
Tuesday, April 16, 2024
Poster location
12
Meeting homepage
Space Weather Workshop 2024
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