Statistical Similarities between WSA-ENLIL+Cone model and MAVEN in situ observations from November 2014 to March 2016

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Normal solar wind flows and intense solar transient events interact directly with the upper Martian atmosphere due to the absence of an intrinsic planetary magnetic field. Since the launch of the Mars Atmosphere and Volatile EvolutioN (MAVEN) mission, there is now a means to directly observe solar wind parameters at the planet's orbital location for limited time spans. Due to the craft's highly elliptical orbit, in situ measurements cannot be taken while MAVEN is inside Mars' magnetosheath. In an attempt to model solar wind conditions during these atmospheric and magnetospheric passages, this research project utilizes the solar wind forecasting capabilities of the Wang-Sheeley-Arge-ENLIL+Cone (WEC) model. These sets of tools are maintained at the Community Coordinated Modeling Center (CCMC). In this study, the model has simulated solar wind parameters such as plasma pressure, temperature, particle density, velocity and magnetic field properties during the time period from late 2014 to March of 2016, with an additional detailed simulation during December 2015 to March 2016. The accuracy of the model was examined for intervals when MAVEN was considered to be in upstream solar wind, i.e., with no exospheric or magnetospheric phenomena altering the in situ measurements. It was determined that the WEC model has the capability to provide statistically similar baseline values for continuous solar wind knowledge. These baseline values can be further improved upon in accuracy when smaller time scales (e.g. 1-2 Carrington rotations) are analyzed. Generally, this study aims to provide a larger context of solar wind driving during gaps in the in situ measurements.

Keywords: CMEs, Mars, WSA-ENLIL+Cone