

Abstract Submitted
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Physics Modeling of Storms and Substorms with Solar Wind Data¹

M. LEILA MAYS, EDMUND SPENCER, WENDELL HORTON, ISIDOROS DOXAS — We construct analytic solar wind signals using data from ACE for the Wang et al. Oct. 3-6 2000 event in which a fast forward shock advanced into a preceding magnetic cloud. We examine the response of the WINDMI model, an eight dimensional model of the solar wind driven magnetosphere-ionosphere system, to our analytic signals for this event. The auroral magnetometer AL signal result from the model driven by the analytic solar wind dynamo voltage captures the 8 substorms in the main phase of the storm. The model mid-latitude magnetometer D_{st} signal used to quantify magnetospheric storms has the correct qualitative feature of a sharp rise for the expansion phase and a slower decay for the recovery phase. The role of the shock can be examined by using analytic signals in which the shock feature in the density, solar wind velocity, and magnetic field are tested individually. The shock near the end of the 42 hr magnetic cloud is shown to be largely responsible for the very large region 1 field aligned current surges associated with the $-AL > 1300\text{nT}$ peaks at the end of the main phase of the storm. We are performing similar analysis to study the role of three fast forward shock events associated with halo CMEs during the April 15-24 2002 geomagnetic storm.

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