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Currents in Saturn's magnetosphere during the January 2007 HST observations

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Using our 3D global MHD model we intend to study the Jan/Feb 2007 time period during which the Hubble Space Telescope made images of the Saturn's aurora. Observations during this time show enhancements in the integrated power of the auroral emissions as well as times when the oval contracts in latitude. We intend to study the response of the magnetosphere to the solar wind during this time period using two different MHD models.

We have recently concluded a detailed validation of our MHD model to propagate the solar wind radially outward from the Earth (ACE) to Saturn [Zieger and Hansen, JGR, 2008]. Using this propagation model we are able to determine the upstream conditions at Saturn. These solar wind values will be used as input to our global, 3D, MHD model of Saturn's magnetosphere, allowing us to simulate the state of the global magnetosphere. Results of the global magnetosphere-ionosphere model will be presented in relation to the current systems in the magnetosphere during the time of the observations. Specifically, we are able to correlate increases in the current into and out of the magnetosphere with times of high dynamic pressure as well as to times of rapid change in the dynamic pressure. In addition we will show results related to the open closed field line boundary and its dependence on dynamic pressure and the magnetic field orientation. Finally, we intend to show how the reaction of the global model may be related to both the ionospheric emission measured by the HST and the SKR as measured by the Cassini RPWS instrument.