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Solar wind influence on Jupiter's magnetosphere and aurora

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Jupiter's magnetosphere is often said to be rotationally driven, with strong centrifugal stresses due to large spatial scales and a rapid planetary rotation period. For example, the main auroral emission at Jupiter is not due to the magnetosphere-solar wind interaction but is driven by a system of corotation enforcement currents that arises to speed up outflowing Iogenic plasma. Additionally, processes like tail reconnection are also thought to be driven, at least in part, by processes internal to the magnetosphere. While the solar wind is generally expected to have only a small influence on Jupiter's magnetosphere and aurora, there is considerable observational evidence that the solar wind does affect the magnetopause standoff distance, auroral radio emissions, and the position and brightness of the UV auroral emissions. We will report on the results of a comprehensive, quantitative study of the influence of the solar wind on various magnetospheric data sets measured by the Galileo mission from 1996 to 2003. Using the Michigan Solar Wind Model (mSWiM) to predict the solar wind conditions upstream of Jupiter, we have identified intervals of high and low solar wind dynamic pressure. We can use this information to quantify how a magnetospheric compression affects the magnetospheric field configuration, which in turn will affect the ionospheric mapping of the main auroral emission. We also consider whether there is evidence that reconnection events occur preferentially during certain solar wind conditions or that the solar wind modulates the quasi-periodicity seen in the magnetic field dipolarizations and flow bursts.