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Jovian Magnetospheric Response to Solar Wind Dynamic Pressure

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Past observations have revealed the typical structures of the Jovian magnetosphere. However, the magnetospheric response to the variable solar wind is still unclear, due to the absence of the solar wind monitor at the Jovian orbit. We approach this issue by using the calculated solar wind parameters via MHD equations whose input parameters are based on the observation at Earth's orbit. Referring the propagated solar wind parameters, we investigated the variability of the Jovian magnetotail observed by the Galileo spacecraft. Through multi-event analyses, we found that the energetic particle fluxes tend to enhance responding to the increase of the solar wind dynamic pressure. In order to understand the cause of the particle flux enhancement, we examined a particular event in detail. The pitch angle distribution of energetic protons (around 100 keV) was almost isotropic during quiet times, whereas it became more field-aligned (mono-directional, parallel or anti-parallel to the magnetic field) after the increase of the solar wind pressure. This suggests that the observed flux enhancement is consistent with the acceleration through magnetotail reconnection, rather than by the simple betatron acceleration associated with the magnetospheric compression, which is caused by the increased solar wind pressure.

Keywords: Jovian Magnetosphere, Solar Wind