

Solar wind dependence and ionospheric mapping of magnetotail plasmoids

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The energy from the solar wind drives magnetospheric dynamics. An important, but difficult to measure, factor is the energy released in plasmoids. Plasmoids are large magnetic structures that form in the Earth's magnetotail during substorms, which are a major mechanism of extracting and releasing solar wind energy from the magnetosphere. During plasmoid formation the 3 dimensional structure of the magnetotail becomes complicated, with spatially alternating closed and open magnetic topologies. Plasmoids are thought to detach from the magnetotail at substorm onset.

We investigate how the solar wind magnetic field affects the formation of plasmoids using observations and the global magnetohydrodynamic simulation GUMICS-4. We also investigate the solar wind dependence of plasmoid foot points, which are the end points of the plasmoid magnetic field in the ionosphere. Our work may be of importance when interpreting some observed, but hitherto unexplained, ionospheric phenomena.

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