SM21B-3147 - Dayside magnetopause reconnection: Its dependence on solar wind and magnetosheath conditions

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Abstract

Magnetic reconnection permits topological rearrangements of the interplanetary and magnetospheric magnetic fields and the entry of solar wind mass, energy, and momentum into the magnetosphere. Thus, magnetic reconnection is a key issue to understand space weather. However, it has not been fully understood yet under which interplanetary/magnetosheath conditions magnetic reconnection takes place more effectively at the dayside magnetopause. In the present study 25 dayside magnetopause reconnection events are investigated using THEMIS observations in order to find its dependence on solar wind and magnetosheath conditions. It is found that the reconnection electric field is proportional to the interplanetary electric field and inversely proportional to the solar wind-Alfvén Mach number, and that the reconnection outflow speed is proportional to the solar wind-Alfvén speed and inversely proportional to the magnetosheath plasma beta. Finally, it is shown that the magnetic shear range with an occurrence of magnetic reconnection is restricted to large shears as the magnetosheath flow direction becomes more perpendicular to the direction of the local magnetopause normal vector. Since these results refer to fairly typical solar wind-Alfvén Mach number condition they may not apply to more extreme condition.

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