



Two distinguished fundamental mechanisms in generating dipolarization process in Saturn's magnetosphere: in-situ evidence from Cassini

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Solar wind energy is transferred to planetary magnetospheres via magnetopause reconnection, and giant planets like Saturn, plasma ejected from their moons provides a major plasma source that drives magnetotail dynamics as well. The energy is regularly released via magnetic reconnection and magnetospheric current re-distributions that usually cause a change of the global magnetic field topology (named substorm dipolarization at Earth). Besides the substorm dipolarization, the front boundary of the reconnection outflow can also lead to a strong but localized magnetic dipolarization, named reconnection front. The enhancement of north-south magnetic component is usually adopted as the indicator of magnetic dipolarization, which however cannot distinguish the two fundamentally different mechanisms. Using measurements from Cassini, we have identified the two types of dipolarization with multiple events in Saturn's magnetotail. A comparison between Earth and Saturn on magnetic dipolarizations is essential to reveal the energy dissipation in planetary magnetotails.