



Acceleration of Energetic Particles from Global Magnetotail Reconfiguration and Relation to Auroral and Radio Emissions at Earth, Saturn and Jupiter

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The occurrence of energetic (10 keV - 1 MeV) charged particles seems to be a universal phenomenon of planets with a sufficiently strong magnetosphere. Energetic particle acceleration is well known to exist at Earth, but has also been found at Saturn, Jupiter and Uranus. In this presentation we discuss the particle acceleration associated with global, substorm-like reconfigurations of the magnetotail at Earth, Saturn and Jupiter, and how those relate to auroral and radio emissions.

At Earth, Energetic Neutral Atom (ENA) observations of global substorm injections correlate very well with the auroral onset as well as with Auroral Kilometric Radiation (AKR). There is a particularly good correlation with the intensification of O⁺.

At Saturn, quasi-periodic particle acceleration events occur in the midnight magnetosphere, again more dramatic for heavy ions. ENA, auroral UV and observation of Saturn Kilometric Radiation (SKR) from the Cassini mission show that all three phenomena are highly correlated and most likely linked to release of plasmoids, which lends support to a substorm-like phenomenon, in which the currents driven by the plasma pressure are at least in part responsible for triggering the instabilities leading to SKR.

At Jupiter, insufficient global imaging data makes it difficult to make any firm conclusions. However, quasi-periodic particle injections have been observed in-situ on the nightside, with features that appear more prominent for heavy ions. We discuss also indicative relations between enhancements in auroral emissions and Jovian kilometric radiation.