



Global Sawtooth Oscillations of the Magnetosphere

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During some geomagnetic storms, geosynchronous-orbit satellites observe that the magnetosphere of the Earth can undergo global sawtooth oscillations. Global sawtooth oscillations are characterized by a periodic stretching and collapse (crash) of the dipole magnetic field at nearly all local times and by a periodic decline and rapid recovery of energetic-particle fluxes at all local times. The rapid recovery of the fluxes can be dispersionless over a very large range of local times. During sawtooth oscillations, the stretching of the field lines can be so great that the lobe is encountered at the equator at geosynchronous orbit. At the time of sawtooth crash, there can be a jump in the magnitude of the Dst index. Statistically, the solar wind that drives sawtooth oscillations has a low number density and a strong southward IMF, with normal to fast speeds, and with low-levels of upstream MHD turbulence. This "sawtooth solar wind" is a low-Mach-number wind that creates an unusual magnetosheath flow with extremely low beta values.