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Comparative magnetotail flapping: An overview of observations at Earth, Jupiter and Saturn

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Abstract

Flapping, the vertical wavy motion of the magnetotail, is now a well-established phenomenon in the Earth's tail. Many events have been studied in the literature, using mainly data from Cluster and Double Star. Its characteristics are periods around 10 minutes, a wave propagation direction from the centre of the tail towards the flanks, and a propagation speed of several tens km/s. In the Earth's tail the temporal gradient of the magnetic field dBx/dt is in anti-phase with the z component of the ion velocity. Recently, it has been shown that the properties of these waves are in good agreement with wave modes in a magnetotail current sheet with a double gradient (dBx/dz and dBz/dx).

During the various outer planet missions, spacecraft have sampled the magnetotails of Jupiter (e.g. Voyager, Pioneer, Galileo) and Saturn (e.g. Cassini). In this presentation we will show observations of the Jovian and Kronian magnetotails where the magnetic field seems to show a flapping behaviour. These magnetometer observations, when possible, are enhanced with particle data information. For some of the events, the case for a flapping behaviour can be made, and these will be studied in more detail.