

The Earth's Magnetopause: Force Balance and Topology Revealed by High Cadence Plasma Measurements

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The magnetopause is strongly influenced by properties of the flowing plasma that it deflects. The Magnetospheric Multiscale Mission has enabled this interaction to be probed in intimate detail. We combine the magnetic measurements of the four spacecraft to demonstrate how the magnetic forces affect the boundary between the shocked solar wind and the Earth's magnetic field. We compare these forces with the plasma pressure, confirming the accurate intercalibration of the plasma and magnetic forces but draw attention to the tradeoff between spatial resolution and accuracy of the gradient measurements so governed by the spacecraft separation. We use the electron distribution function to examine the topology of the magnetic field. Small pockets of low magnetic field strength, small radius of curvature magnetic field lines and high electric current mark the electron diffusion region.

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