

Plasma Waves associated with Dione's Magnetospheric Interaction

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Cassini has executed five close flybys of the icy moon Dione during its mission at Saturn. The Radio and Plasma Wave Science (RPWS) instrument observed the plasma wave spectrum during each of the encounters. These observations are joined by those from the Cassini Plasma Spectrometer (CAPS), Magnetospheric Imaging Instrument (MIMI), and the Magnetometer instrument (MAG), although not all instruments provided data for all flybys. The first, fourth, and fifth flybys were near polar passes while the second and third were near wake passes. The second flyby occurred during a time of hot plasma injections which are not thought to be specifically related to Dione. The Dione plasma wave environment is characterized by an intensification of the upper hybrid band and whistler mode chorus. The upper hybrid band shows frequency fluctuations with a period of order 1 minute that suggest density variations of up to 10%. These density variations are anti-correlated with the magnetic field magnitude, suggesting a mirror mode wave. Other than these periodic density fluctuations there appears to be no local plasma source which would be observed as a local enhancement in the density although variations in the electron distribution are apparent. Wake passages show a deep density depletion consistent with a plasma cavity downstream of the moon. Energetic particles show portions of the distribution apparently absorbed by the moon leading to anisotropies that likely drive both the intensification of the upper hybrid band as well as the whistler mode emissions. We investigate the role of electron anisotropies and enhanced hot electron fluxes in the intensification of the upper hybrid band and whistler mode emissions.