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JADE observations highlights

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Thanks to Juno's very eccentric orbit (apojove $\sim$ 110 Rj, perijoe $\sim$1.05 Rj), JADE observes plasma populations throughout the Jovian magnetosphere: the magnetosheath through the magnetopause; the outer, middle, and inner magnetosphere; and close-in down to the ionosphere. We present here some of the highlights of the JADE observations from the first to the most recent orbits.

Plasma disk crossings in the middle and inner magnetosphere show a mixture of heavy and light ions. A novel analysis technique allows us to separate O+ from S2+ in the TOF spectra. During perijove crossings at high latitudes when Juno was connected to the Io torus JADE-I observed heavy ions with energies consistent with a co-rotating pickup population. At sub-auroral and equatorial latitudes, low energy (<100 eV) ionospheric ion distributions are observed that are distinct from the Io torus population.

The electron pitch angle distributions on field lines connected to the auroral regions change as a function of radial distance. For example, the higher energy electrons (30-100 keV) are mostly isotropic at large distances and mostly trapped closer to Jupiter, while the lower energies (<3 keV) are mostly field aligned at most distances.

Over the polar and auroral regions, JADE observed bi-directional electron beams having broad energy distributions interspersed between beams of upward electrons with narrow, peaked energy distributions, regions void of these electrons, and regions dominated by penetrating radiation. In most instances the electrons show evidence of acceleration via stochastic processes (broad energy distributions) and sometimes via parallel electric fields (inverted-V structures). One of the most surprising and still puzzling results is that the upward energy flux of the electron distributions is typically greater than the downward energy flux, except when Juno is connected to the diffuse aurora equatorward of the main auroral emission.