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# Ten Years of ENA Imaging from Cassini

Pontus Brandt (1), Donald Mitchell (1), Joseph Westlake (1), James Carbary (1), Christopher Paranicas (1), Barry Mauk (1), Stamatios Krimigis (1,2)

(1) The Johns Hopkins University Applied Physics Laboratory, SRP, Laurel, United States (pontus.brandt@jhuapl.edu), (2) Academy of Athens, Athens, Greece

In this presentation we will provide a detailed review of the science highlights of the ENA observations obtained by The Ion Neutral Camera (INCA) on board Cassini. Since the launch of Cassini, INCA has unveiled an invisible world of hot plasma and neutral gas of the two biggest objects of our solar system: the giant magnetosphere of Jupiter and Saturn. Although more than ten years ago, INCA captured the first ENA images of the Jovian system revealing magnetospheric dynamics and an asymmetric Europa neutral gas torus. Approaching Saturn, INCA observed variability of Saturn's magnetospheric activity in response to changes in solar wind dynamic pressure, which was contrary to expectations and current theories. In orbit around Saturn, INCA continued the surprises including the first imaging and global characterization of Titan's exosphere extended out to its gravitational Hill sphere; recurring injections correlating with periodic Saturn Kilometric Radiation (SKR) bursts and magnetic field perturbations; and the discovery of energetic ionospheric outflow.

Perhaps most significant, and the focal point of this presentation, is INCA's contribution to the understanding of global magnetospheric particle acceleration and transport, where the combination between ENA imaging and in-situ measurements have demonstrated that transport and acceleration of plasma is likely to occur in a two-step process. First, large-scale injections in the post-midnight sector accelerate and transport plasma in to about 12 $R_S$ up to energies of several hundreds of keV. Second, centrifugal interchange acts on the plasma inside of this region and provides further heating and transport in to about 6$R_S$. We discuss this finding in the context of the two fundamental types of injections (or ENA intensifications) that INCA has revealed during its ten years of imaging. The first type is large-scale injections appearing beyond 12 $R_S$ in the post-midnight sector that have in many cases had an inward component of propagation. The second type is apparently local injections inside of about 12 $R_S$ and as far in as 6$R_S$ in the pre-midnight sector with a recurrence period around 11h that, interestingly, appear to precede the larges-scale injections.