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Mapping energetic electrons in the magnetosphere of Saturn with the Cassini RPWS Langmuir Probe

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The Cassini Langmuir Probe (onboard RPWS experiment) has provided wealth of information about the Saturnian cold plasma environment since the Saturn Orbit Insertion in 2004. The analysis of the current measured by the probe for negative potentials (mostly due to ions) reveals also a strong sensitivity to energetic electrons (250-450 eV). These electrons impact the surface of the probe, and generate a detectable current of secondary electrons. We studied the impact of this sensitivity to energetic electrons on the behaviour of the probe, as well as on our understanding of the plasma parameters from the Langmuir probe analysis. We thus observe a strong asymmetric (day/night) peak of energetic electrons in the inner magnetosphere between the Dione and Rhea dipole L shells, as recently investigated with the CAPS ELS instrument. A case study also suggests that the mapping of the secondary electron current measured by the Langmuir probe allows to identify the region of Saturnian closed field lines. We finally investigated several methods to detect and/or remove this current which may alter the cold ion parameter determination in the inner magnetosphere of Saturn.