

In-situ measurement of cusp plasma irregularity by sounding rocket - ICI-3 campaign -

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The ICI-3 (Investigation of Cusp Irregularities-3) campaign was conducted in Svalbard, Norway on December 2011. Science objective of ICI-3 is to obtain a better physical description of instabilities and wave phenomena driven by the newly discovered Reversed Flow Events (RFEs) in the winter cusp ionosphere. In particular, we would like to elucidate the following unresolved problem: 1)whether the RFEs are associated with a tangential discontinuity or a rotational discontinuity, 2)if the RFE-Birkeland current sheets are related to inverted-Vs, and 3)Identification of wave phenomena and non-linear saturation. In-situ measurements by sounding rockets will be needed to understand inherent cause of such phenomena.

The ICI-3 sounding rocket was launched at 07:21:31 UT at Ny-Alesund in Svalbard on December 3, 2011, and it successfully intercepted the cusp aurora region. All onboard systems functioned flawlessly. Measurements of the electron density and its perturbation, low energy electron flux, AC and DC electric fields, and field-aligned currents were made to conduct a comprehensive study with the aim to exploit the potential role of the gradient drift instability versus the other suggested mechanisms for the cusp plasma irregularity. An independent attitude determination system was prepared to define the orientation of the payload in order to derive vector field measurements.

We present a result obtained from a fixed-bias Langmuir probe which was installed to measure fine-scale (~1 m) electron density perturbation.

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