



Plasma dynamics in the region of auroral arcs: simultaneous observations by SuperDARN, IMAGE, POLAR and DEMETER

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Abstract

We have used measurements of the ionospheric plasma velocity made by the SuperDARN radars and by the DEMETER satellite and simultaneous auroral images from the UV cameras on IMAGE and POLAR to study the dynamics of the thermal plasma in the region of auroral arcs. DEMETER which has been launched on June 29, 2004, on a polar circular orbit at an altitude of 710 km, operates between -63° and $+63^\circ$ magnetic latitudes to search for possible ionospheric disturbances of seismic origin. During magnetically active periods, this range of latitudes encompasses part of the auroral zones in both hemispheres. Its scientific payload includes a thermal ion analyser and an electric field instrument that provide high-resolution measurements of the thermal plasma flows and of the associated electrostatic emissions. We present a series of observations in the mid-night sector during the strong magnetic storm of November 8, 2004 and discuss (i) the oxygen up-welling associated with the electron precipitations in the ionosphere, (ii) the variation of the thermal plasma parameters inside the auroral arcs and (iii) the ULF and ELF electric fields that are associated with these auroral features and the corresponding plasma flows.