Geophysical Research Abstracts,
Vol. 11, EGU2009-8782, 2009
EGU General Assembly 2009

Mesoscale structure in ion-neutral coupling over Svalbard

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An all-sky FPI called the Scanning Doppler Imager (SCANDI) has been operated at the new Kjell Henriksen Observatory at Longyearbyen, Svalbard (78.1 N, 16.0 E) since November 2007. Observations of thermospheric winds, temperatures and red and green line intensities have been made during the hours of darkness for 2 winters at this polar cap site, including 24 hour coverage during December through January. The field of view has a diameter of up to 1000km, depending on the height of the emission studied, which is split into 25 sectors; and an integration time of 5 minutes. This allows high spatial resolution observations of thermospheric behaviour at a reasonably high time resolution. Svalbard hosts the EISCAT Svalbard radars which provide high resolution ionospheric parameter measurements along the line-of-sight of the 2 radars; and Svalbard is also in the field-of-view of the CUTLASS coherent scatter radars, which provide spatially extended horizontal maps of ionospheric velocities. Combined with magnetometer and all-sky camera images, meso-scale features have been identified and monitored to investigate the response times and the spatial extent of ion-neutral coupling. These scale sizes indicate that smaller grid sizes are necessary for the next generation of general circulation models for the upper atmosphere.