

Optical measurements of polar cap patches - preliminary results -

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We have started optical measurement with highly sensitive all-sky imager at Resolute Bay, Canada (geographic latitude 74.7; geomagnetic latitude 82.9). The imager has been employed to detect low-latitude aurora, travelling ionospheric disturbances and plasma bubbles in the mid and low-latitudes. The excursion of the imager to the high-latitudes aims at visualising an airglow whose luminosity is much weaker than that of the aurora. Primary target of our measurement is polar patches, which are defined as a region of plasma density enhancements drifting anti-sunward across the polar cap. Since plasma density enhancement within the patch approximates to a factor of 2 or more at F-region heights, the highly sensitive optical instrument can figure out spatial structure of patches at 630nm wavelength.

We show some examples of polar patches observed in January 2005. Their morphological features (velocity and direction of the drift, shape, recurrence rate etc.) are summarised at first, and then their relationship with IMF variations are discussed. The imager has a common volume with 5 radars of the Super Dual Auroral Radar Network. The SuperDARN radars can detect polar patches as a field-aligned plasma irregularities (FAIs). We also discuss relationship between plasma density patches (optical patches) and FAI patches (radar patches) in terms of ionospheric plasma instabilities such as gradient-drift instabilities.