

パルセーティングオーロラ中の下部熱圏風速変動

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Lower-thermospheric wind variations in the pulsating aurora

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Simultaneous observations were conducted with a Fabry-Perot Interferometer (FPI) at a wavelength of 557.7 nm, an all-sky camera at a wavelength of 557.7 nm, and the European Incoherent Scatter (EISCAT) UHF radar during the Dynamics and Energetics of the Lower Thermosphere in Aurora 2 (DELTA-2) campaign in January 2009. This paper concentrated on two events during periods of pulsating aurora. The lower-thermospheric wind velocity measured with the FPI showed obvious fluctuations in both vertical and horizontal components. Of particular interest is that the location of the fluctuations was found in a darker area that appeared within the pulsating aurora. During the same time period, the EISCAT radar observed sporadic enhancements in the *F*-region backscatter echo power, which suggests the presence of low-energy electron (1 keV or lower) precipitation coinciding with increase in amplitude of the electromagnetic wave (at the order of 10 Hz or higher). While we have not yet identified the dominant mechanism causing the fluctuations in FPI-derived wind velocity during the pulsating aurora, the frictional heating energy dissipated by the electric-field perturbations may be responsible for the increase in ionospheric thermal energy thus modifying the local wind dynamics in the lower thermosphere.

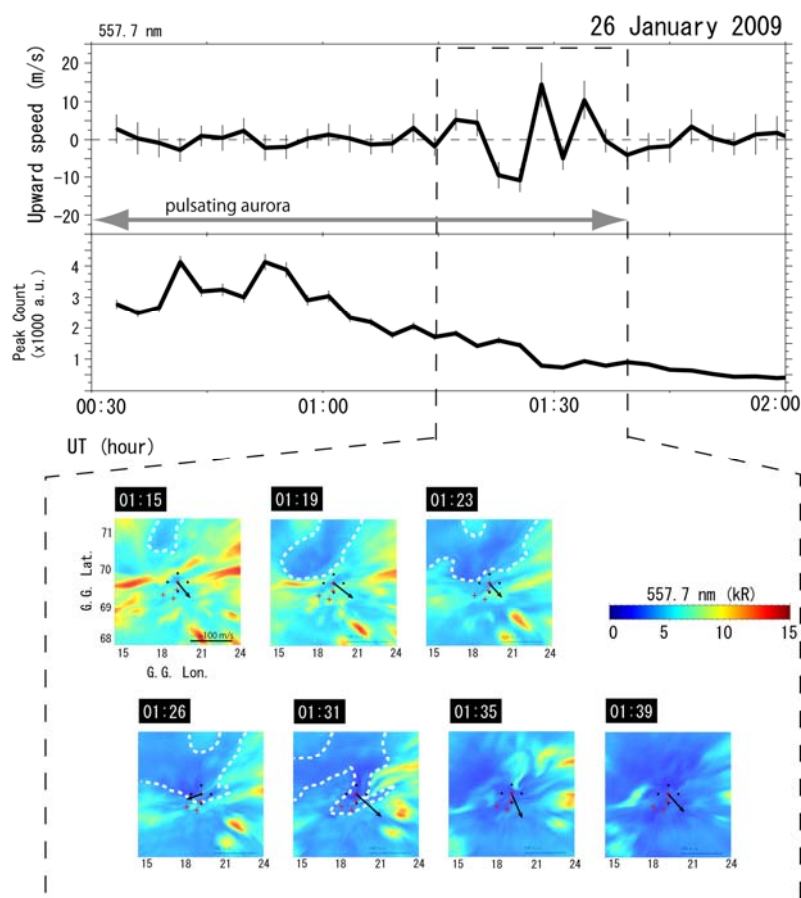


Figure 1. Top and middle panels show the temporal variations in the vertical wind speed and the fringe peak count at the zenith, respectively, measured with the FPI (557.7 nm) from 00:30 to 02:00 UT on 26 January 2009. Vertical bars are the 2σ uncertainty ($\pm 1\sigma$). The bottom color panels show the horizontal aurora images taken with an all-sky camera at 557.7 nm from 01:15 to 01:39 UT during pulsating aurora (corresponding time interval is marked by black dashed line in the top two panels). The color scale of optical intensity is shown at the right middle. These images are mapped in geographic coordinate assuming the peak emission height is 110 km. The five black dots and the four red crosses indicate the location of the FPI and the EISCAT UHF radar observation positions, respectively. The black arrows correspond to the horizontal component of the FPI-derived neutral wind velocity (the scale is presented at the right bottom corner of the first panel from the left). White dashed lines in the colored panels are drawn to easily identify the darker area (after Oyama *et al.*, 2010).

Reference

Oyama, S., K. Shiokawa, J. Kurihara, T. T. Tsuda, S. Nozawa, Y. Ogawa, Y. Otsuka, and B. J. Watkins, Lower-thermospheric wind fluctuations measured with an FPI during pulsating aurora at Tromsø, Norway, *Ann. Geophys.*, 28, 1847-1857, 2010.