

# Observation of the lower thermosphere dynamics associated with aurora activity at Syowa station with FPI and ASI

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The thermosphere in polar region is coupled to the ionosphere and magnetosphere through complex processes such as auroral particle heating, Joule heating, ion drag, and neutral drag. Fabry Perot imager (FPI) has been widely used for observation of thermosphere because it can directly obtain winds and temperatures from measurements of Doppler shift and width of an auroral emission line, respectively. However, altitude change of physical quantities in the lower thermosphere is quite large in the lower thermosphere. This fact has so far prevented to distinguish whether observed change of the lower thermospheric dynamics is due to altitude change or real physical change, and there are very few reports on the lower thermospheric dynamics.

A new FPI was installed at Syowa station by 42nd Japanese Antarctic Research Expedition team, and simultaneous observation using the FPI and an all-sky imager (ASI) was carried out. ASI observation enables us to derive altitudes of 557.7nm emission from the intensity ratio of 630.0nm to 557.7nm emissions, and is very useful for interpretation of FPI observation of 557.7nm. Observation results on the night of July 16/17, 2001 when the sky was clear and auroral activity changed from quiet to active conditions.

Primary results of the observation are as follows.

1) Although long term change of line of sight component of the wind velocity, spanning 9 hours from dusk side to dawn side, agreed well with the direction of ionospheric convection pattern, change of larger than 100m/s in 30 minutes were observed at times of auroral breakup.

2) Temperature variation is generally explained by change of emission altitude. However, temperature increase of larger than 100K, which can not be attributed to altitude change, was observed at a position separated from an auroral arc at a time of substorm growth phase.