

THERMOSPHERIC WIND AND TEMPERATURE MEASUREMENTS BY THE FABRY-PEROT IMAGER AT SYOWA STATION (2)

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This paper reports thermospheric neutral wind and temperature variations derived from the Fabry-Perot Imager (FPI) observation at Syowa Station, Antarctica in 2001. A routine observation of the FPI started on March 31, 2001. During the 2001 winter season the FPI was operated on 71 nights by the end of the observation season on October 16 acquiring approximately 50,000 interference fringe images of OI 557.7 nm and OI 630.0 nm emissions.

Horizontal distributions of thermospheric wind and temperature are derived from the fringe images acquired. After a fringe image is calibrated using a flat-field image and a dark image, a Gaussian function is fitted to each fringe peak to extract Doppler shifts of the auroral emission. Temporal drift of the spacing is corrected using fringe images of a frequency stabilized He-Ne laser. Since the observed fringe pattern is convolution between a source spectral profile and an instrumental function, derivation of temperature requires deconvolution of the instrumental function. The instrumental function at the wavelength of OI 630.0 nm was determined from fringe images of the laser.

To derive absolute values of wind speed with an accuracy of 5 m/s an absolute spacing of the interferometer must be known with an accuracy of $10E-8$. This accuracy can be accomplished by comparison with the known wavelength of a frequency stabilized He-Ne laser emission. The absolute spacing is the product of the wavelength and the order of interference, which in this case is not necessarily an integer. The order of interference was determined by comparison among average fringe peak positions of OI 557.7 nm, OI 630.0 nm and laser emissions. Though the average wavelengths of OI 557.7 nm and OI 630.0 nm emissions may include Doppler shifts of average line-of-sight velocities, combination of three wavelengths gives a unique solution of the order of interference.

OI 630.0 nm image data obtained by the FPI observations in the 2001 season were analyzed in the procedure above. Seasonal and daily variations of wind and temperature in the F-region will be presented.