

A method to obtain absolute auroral intensity from image data of aurora spectrograph

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The aurora spectrograph was installed in Spitzbergen in March 2000. It is an imaging spectroscopic instrument which can obtain auroral spectra along a magnetic meridian with a field of view of 180 degree.

In order to obtain absolute intensities of aurora over full field of view from raw spectral image data, effects such as wavelength dependence of transmission of optics and that of CCD quantum efficiency as well as limb darkening caused by the optics have to be removed using calibration data. We have made it possible to get absolute values of auroral intensity based on the calibration of the instrument carried out using a calibration facility of NIPR. In addition, we have evaluated nonlinearity of wavelength against CCD pixel column, and curvature of slit image on the image plane.

Aurora spectrograph was installed at Aurora Station at Longyearbyen in Spitzbergen in March 2000, and observation was started immediately. The aurora spectrograph is an imaging spectroscopic instrument, using a grism as a dispersive element. It can obtain auroral spectra along a magnetic meridian with a field of view of 180 degree on a CCD chip of 512 x 512 pixels over 450nm-760nm spectral range with a wavelength resolution of 1.5nm.

Raw spectral image data obtained with the aurora spectrograph contain wavelength dependence of transmission of optics as well as that of CCD quantum efficiency. Further, the raw data is affected by limb darkening effect caused by the optics. In order to obtain absolute intensities of aurora over full field of view, these effects have to be removed using calibration data. We have made it possible to get absolute values of auroral intensity based on the calibration of the instrument carried out using a calibration facility of NIPR. In addition, we have evaluated nonlinearity of wavelength against CCD pixel column, and curvature of slit image on the image plane. We will present how auroral absolute intensities can be obtained from the raw data along with a detailed evaluation of performance of the instrument.