

Computer simulation of auroral fine structure observations by the multi-spectral auroral camera onboard INDEX

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In order to clarify the fine-scale auroral dynamics, imaging observations of optical auroras will be performed with high-time and high-spatial resolutions by a multi-spectral auroral camera (MAC) onboard INDEX, which will be launched in August 2005 by Russian Dnepr rocket as a piggyback satellite into a noon-midnight polar-orbit at an altitude of 610 km. Auroral images at emissions of N2+ 1NG(427.8 nm), OI(557.7 nm), N2 1POS(670 nm) are obtained by three independent channels of the MAC with maximum time and spatial resolutions of 120 msec and 2 km, respectively. MAC will observe auroras mainly in the two modes as follows: 1) simultaneous observation of plasma particles and optical auroras in the magnetic footprint direction, 2) observation of auroral height distribution in the limb direction.

To examine the characteristics of auroral images observed by the MAC, we made computer simulations shown in the following manner. Auroral height profile was calculated by using the two-stream electron transport code and the MSISE-90 model atmosphere with appropriate collision coefficients. Latitudinal and longitudinal distributions of auroral arc were assumed to be thin (e.g., 1km) and uniform, respectively. Using this model, auroral image data were simulated in the cases of two observation modes described above. In the presentation, we report the effect of overlapping of auroral emission in the line-of-sight direction, and the apparent variations of auroral distributions emitting in the same field line due to the energy dependence of stopping height of precipitating electrons.