Auroral green line emission profiles derived from the ROCSAT-2/ISUAL observation

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Various features of the auroral emissions are caused by precipitating particles, which have various energy distributions, from the magnetosphere into the upper atmosphere. Auroral emission profiles have been estimated by a numerical calculation method assuming the energy distribution of precipitating particles, collision processes between precipitating particles and neutrals, and an atmospheric model. However, production mechanisms of some types of aurora cannot be explained by such a method. It is, therefore, necessary to show the relationship between precipitating particles and auroral emission, particularly auroral emission profile, from observations. Although previous ground-based and satellite observations have been useful to understand horizontal extent of aurora and its dynamics, auroral emission profile has not been obtained so much by these observations because of atmospheric attenuation and lack of limb observations. In this study, we derive auroral emission profiles from the ROCSAT-2 satellite observations.

The ROCSAT-2 satellite was launched into a polar orbit with an altitude of 891 km and an inclination of 99.1 degree on May 20, 2004. The Imager of Sprites/ Upper Atmospheric Lightning (ISUAL) instrument was onboard the ROCSAT-2 satellite as only one scientific payload, and observes sprites and related optical phenomena. The ISUAL consists of three subsystems: an imager, a spectrophotometer, and an array photometer. ISUAL instrument onboard ROCSAT-2 satellite has detected not only phenomena such as sprites but also auroral emissions from limb observations.

In this study, we have analyzed the auroral emission (557.7 nm) data which were observed in the south of Australia at 17:46-17:49 UT on August 31, 2004. This event was observed during the recovery phase of a geomagnetic storm. The observed curtain-like auroras have a very bright and thin layer in the bottom region of the emission. We estimate the width of the emission layer in the bottom region to be about 30 km. Furthermore we examine the possibility of simultaneous observations with the ROCSAT-2 and the other satellites which have a charged particle detector.

It is found that we have an opportunity for a simultaneous ROCSAT-2 and NOAA 16 satellite observation once in six days. In this presentation, we show initial results of the event observed on August to 31, 2004. We also compared the results with those obtained from model calculations.