

An estimation of three-dimensional structures of airglow emission discontinuities using images taken from ISS

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Three-dimensional structures of airglow emission discontinuities were revealed using images taken by astronauts from International Space Station (ISS). Airglow layers over the Earth's rim were captured by astronauts with a digital camera at night. Because these images were for the visible-light range, Na 589nm and OI 557.7nm emissions 90km altitude were expected to be dominant on these images. Two discontinuities on the airglow layers were observed on 16 October 2011 and 26 August 2014. They were observed from various viewing-angles during observing time 4m24s and 8m15s. Thus the three-dimensional structures of the discontinuities were estimated from these series of images. It was found that the structures would be caused by splitting of two emission layers, Na and OI. It is also found that they extended over 700km in the east-west direction. We estimated the altitude distributions of these emission layers' intensity and their RGB ratio by using Abel function. From the ground-based optical observation, mesospheric bore has been observed as an airglow discontinuity by terrestrial observation of airglow. The observed discontinuities and the bores have similarities and differences. In the presentation, the three-dimensional structures of the discontinuities will be reported, and their generation mechanism will be discussed in the comparison with the bore.

Keywords: airglow, mesospheric bore