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Analysis of the vertical and horizontal structures of the airglow observed by the Reimei satellite

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The vertical structure and the horizontal structure of the O airglow and the OH airglow observed by the Reimei satellite were studied. Observations of the airglow by ground-based imagers are carried out for many times. There are observations of the airglow by WINDII/UARS in 1990s. There are few observations of the airglow emission by the artificial satellites in recent 10 years. The observational data of the O airglow (557.7-nm wavelength) and the OH airglow (670-nm wavelength) taken by the Multi-spectral Auroral Camera (MAC) on the Reimei satellite in the Earth limb direction are used in this study. The measured data of Reimei/MAC is integration value. Volume emission rate of airglow was derived from the observational data under the assumption of the uniformity of the volume emission rate in the emission layers. There was the difference of 10 km in altitude between the emission layer of the O airglow and that of the OH airglow. This difference is consistent with the results of the previous observations. Reimei/MAC observes the airglow emission in the region from 45° N to 15° N. The declination of the volume emission rate of these airglow emissions in the equatorial direction were found from the statistical studies of the observational data from March 2008 to December 2010. The latitudinal structures found in this study were different from that of the earlier studies and the calculations with the models. The volume emission rate of the airglow depends on the number density of the emission sources and the temperature. The number density of O and OH, which are the main sources of the airglow emission observed by Reimei/MAC, are thought to be affected by the atmospheric tide.

Keywords: airglow, the Reimei satellite, Multi-spectral Auroral Camera, volume emission rate