

OH airglow in the auroral zone

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The layer of OH airglow has an intensity peak at an altitude about 85km. Since observation of an OH vibration-rotation band is an effective and the most convenient method to obtain neutral temperature of the mesosphere, it has been commonly used in the low and middle latitude regions.

One of the purposes of our study is to estimate a local energy flux deposited by aurora particle precipitation to the upper mesosphere by means of observing OH rotational temperature and auroral activities. There have been only few works relating to this subject in the past, because auroral emissions overlap with an airglow spectrum in the visible and near infrared regions. The only practical way of the OH rotational temperature measurement in the aurora zone is to make the instrumental field-of-view look at the sky free from auroral luminance. Theoretical studies demonstrate possibility of OH airglow enhancement by precipitation of very high energy auroral particles [Maeda, 1968, Gattinger, 1969]. However, no observational fact has been shown so far [cf.Harrison,1970]. The reason of the negative result may be that the sensitivity of the devices used in those observations was too low to detect rapid OH airglow enhancement of which a time constant is estimated to be ~ 10 sec. The second purpose of our study is to detect an OH airglow enhancement in association with an auroral activity.

As the first step to achieve these purposes, we must know the OH vibration-rotation band with the least contamination by aurora. Using a grating spectrometer with CCD and InGaAs array detectors airglow spectra in the wide wavelength ranges from visible to near infrared