

## Inter-annual variations of Nitric Oxide in the polar mesosphere observed by a millimeter-wave radiometer at Syowa

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Recent observations revealed that the nitrogen oxides (NO,NO<sub>2</sub>) are increased in the lower thermosphere and the mesosphere and the upper stratosphere, when energetic particle precipitations associated with solar proton events or magnetic storms occurred (e.g. Lopez-Puertas et al. 2005). To detect such the enhancement, we installed a millimeter-wave spectroscopic radiometer at Syowa Station in Antarctica, and observation of the NO spectrum has been conducted since January 2012. The NO column density derived from this observation shows a seasonal variation that the NO column density increases in winter. In winter, the observed NO column density of 2014 is lower than 2012 and 2013.

To study reliability of millimeter wave spectral radiometer, we compared the NO column amount with the SOFIE sensor on board AIM satellite. We picked observed data in the same magnetic latitude zone as the Syowa Station, and calculate an NO column density. The NO column density observed at Syowa Station and SOFIE shows a same tendency. Further, we compared month averaged NO column density, and found a good correlation. From this, the millimeter-wave spectral radiometer do uniform observations, and decreasing of the NO column density in 2014 winter season is reliably phenomenon.

Next, we study about impact of variations of relativistic electron flux to NO column density in winter. We used the electron flux data observed from POES satellites and calculated monthly integrated amount of the electron flux. The electron flux in the 2014 is less than those of 2012 and 2013. In particular, this tendency is significant in a period between April and August in 2014. From this, a lower amount of NO column density of 2014 winter may be caused by a low amount of relativistic electron flux.

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