



Seasonal variations of tertiary and secondary ozone maxima observed by JEM/SMILES

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We represent seasonal variations of the tertiary and secondary peaks of ozone according to the SMILES (Superconducting sub-Millimeter Limb Emission Sounder) observation. The tertiary ozone maximum is typically known to form around high-latitude winter mesosphere at an altitude of 70 km. The reason would be the decrease of odd-oxygen losses due to the lower concentrations of odd-hydrogen. The secondary ozone peak exists in upper mesosphere lower thermosphere (MLT) (90-105 km) near the location of atomic oxygen maximum density. Although there are still database limitations for night time ozone measurements in the mesosphere - day and night time ozone measurements should be separated because of the strong diurnal variation of ozone in mesospheric region - , SMILES sub-millimeter passive sensor was able to observe the atmosphere during day and night time. SMILES is a highly sensitive radiometer to observe atmospheric compositions located at the Japanese Experiment Module (JEM) on board the International Space Station (ISS) with the latitudinal coverage of 38S to 65N. It successfully measured vertical distributions and diurnal variations of ozone from upper troposphere to MLT region during its operational period October 2009 to April 2010. The precision of SMILES mesospheric ozone is less than 10-30%.

We depict monthly latitudinal distributions of the ozone mixing ratio profiles, as well as the seasonal variations of profiles at several latitudes. At northern polar region, the altitudes of the mesospheric ozone maxima are determined at 70 and 90 km for tertiary and secondary peaks respectively. The ozone concentrations of tertiary and secondary ozone layers were shown to vary seasonally around 50%. The ozone minimum is shown below 80 km with the daily means lower than 0.25 ppm. As a near future perspective to expand our understanding of mesospheric ozone, we aim to compare the mesospheric profiles with GOMOS (Global Ozone Monitoring by Occultation of Stars) ozone measurements.