

Analysis of Short-term Variations of Stratospheric Ozone Connected with Dynamical Variations

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Recent studies suggest that ozone trend in the stratosphere is affected by dynamical variations such as change of transport [e.g. Wohltmann & Rex, 2005]. In order to understand the influence of short-term variations of transport on the stratospheric ozone, we investigate relationships between the ozone mixing ratio and dynamical parameters in the stratosphere. For this purpose, we used the vertical profiles of stratospheric ozone from 20 to 60 km which have been measured every 10 minutes with a ground-based millimeter-wave radiometer at Rikubetsu, Japan (43.5N, 143.8E) by conducted by NIES since November 1999. Meteorological data over Rikubetsu every 6 hours were taken from NCEP Reanalysis Data. We compared the ozone mixing ratio with the potential temperature and potential vorticity at four altitude levels during the period from November 1999 to December 2001, and found that the ozone mixing ratio is well correlated with the potential temperature rather than potential vorticity at 20 km but is correlated with the potential vorticity at 26 km. These results indicate that the vertical displacement rather than the horizontal transport affects the short-term variations of ozone at 20 km and that the horizontal transport plays a dominant role of the ozone variations at 26 km, suggesting that different dynamical processes contribute to the short-term variations of stratospheric ozone.