R005-55
Zoom meeting C ：11/3 AM1 (9:00-10:30)
9:30〜9:45

Exploring interannual and long-term variability of the stratospheric ozone using the Aura/MLS Level3 dataset

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We present the interannual and long-term characteristics, especially the over-two-years components, of the global stratospheric ozone and the variation mechanism by using the Aura/MLS Level3 Ozone dataset. Among the stratospheric interannual variations, QBO (quasi-biennial oscillation) is a well-known phenomenon that the stratospheric zonal wind upon the equatorial region changes its direction in about every 13 months (e.g. Baldwin et al., 2001). In this study, using the Aura/MLS Level3 ozone data (version 4.2) which is the daily binned zonal average every 4 degree in latitude, the temporal variations of ozone were separated into three components with different time periods of less than 2 years, 2-to-5 years and more than 5 years, using the digital filter method by Nakazawa et al. (1997), and their characteristics of the time variability were obtained for each pressure level and latitude.

The obtained 2-to-5-years component of ozone in the equatorial region shows a significant feature of temporal variation whose amplitude is estimated as 7.4% of the average in 2010, associated with the zonal wind QBO. In addition, a remarkable phase reversal of the ozone variation at around the pressure level of 15 hPa (25 km) was clearly seen, being consistent with previous results (e.g. Bai et al., 2021). This indicates that the present analysis method was found to produce results comparable to those of the previous studies. In addition to the equatorial region, a prominent QBO-like signal was detected in the polar region around the latitude of 80 degree in north and south, and these maximum and minimum occur during the polar summer. We found that the amplitude of the polar QBO-like signal varies from year to year: the signal over the Arctic region is amplified in 2009-2014 period and 2018-2020 period with an amplitude of about 3.6%˜9.1% of the average in 2010, although that in the Antarctic region was in 2007-2011 and 2016-2020 with an amplitude of about 4.2%˜9.3% of the 2010 average.

In the presentation, the further details of the characteristics of the interannual and long-term variations of the stratospheric ozone, their connection with the QBO in the equatorial region and other contributors such as solar activities and Arctic Oscillation to the QBO-like signal will be discussed.

References

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