

Madden-Julian Oscillation in Wintertime Ozone in the Upper Troposphere and Lower Stratosphere

Yuli Zhang¹, Chuanxi Liu¹, Yi Liu¹, and V. F. Sofieva²

¹ *Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing, China*

² *Finnish Meteorological Institute, Helsinki, Finland*

This is a template file for submitting abstracts to the SPARC General Assembly 2018. All abstracts must be prepared according to the following instructions.

Wintertime ozone variability related to the Madden-Julian Oscillation (MJO) in the upper troposphere and lower stratosphere (UTLS) has been investigated by using HARMONized dataset of satellite ozone profiles (HARMOZ). The results show that there are pronounced eastward-propagating MJO-related ozone anomalies observed during MJO phases 3–7 in UTLS over Asia, when MJO-related tropical deep convective anomalies move from equatorial Indian Ocean towards western Pacific Ocean. The variation of tropopause in subtropics caused by MJO-related circulation is responsible for these ozone anomalies in UTLS. The MJO-related ozone anomalies show different vertical structures over the Tibetan Plateau and East China. Further analysis suggests that the different sampling errors may be partly responsible for the discrepancies among different satellite measurements.

The different characteristics of MJO-related ozone variability in El Niño and in La Niña winters have been further compared to reveal the effect of ENSO on ozone variability in UTLS. The result shows that the influence of ENSO on MJO-related ozone variability in UTLS is indirectly via its influence on Walker circulation. There are stronger upwelling/weaker descending anomalies of Walker circulation propagate from Indian Ocean to Maritime Continent in La Niña winters. As a result, smaller MJO-related OLR and stronger negative/weaker positive ozone anomalies are observed over East Asia in La Niña winters than in El Niño winters. However over southwest Pacific, upwelling/descending anomalies of Walker circulation are more significant in El Niño winters which consistent with smaller MJO-related OLR anomalies and stronger negative/weaker positive ozone anomalies over northwest Pacific.

Key words: Madden-Julian Oscillation, Ozone Variability, UTLS, ENSO