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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Vertical structure of MJO-related subtropical ozone variations from MLS, TES, and SHADOZ data" *by* K.-F. Li et al.

Anonymous Referee #1

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Review report on Vertical structure of MJO-related subtropical ozone variations from MLS, TES, and SHADOZ data, by Li et al., submitted to ACPD.

This paper analyzes ozone profile measurements from satellite sensors and ozonesondes at Fiji (18S, 178E) and confirms that the significant MJO-time scale ozone variability in the subtropics is located around 100-50 hPa, i.e., in the stratosphere. This is a follow-on paper by the same group (Tian et al., 2007) who analyzed satellite total ozone data and found significant MJO-time scale ozone variability in the subtropics. The analysis method is sound, and the logic is clear. The paper is well written and concise, and the figures are well organized and easy to understand. I recommend its publication basically in its present form.

The authors may or may not consider the following comments of mine during the per-

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Interactive Discussion
Discussion Paper

paration of the final revised manuscript.

1. I am interested in what is happening beyond 40N and 40S. Is there a teleconnection-like pattern, i.e., a wave train of quasi-stationary Rossby waves along the great circle? There are some hints in Fig. 3 and also in figures by Weare (JGR, 2010). If there is such a wave train, lower stratospheric ozone should respond to it.

2. The authors emphasize that the signal is mainly located within the stratosphere. But, at the same time, based on the TES results, the authors note that there are some contributions (24%-27%) from the troposphere. If this is related to the stratosphere-to-troposphere (ST) ozone irreversible transport, there could be a significant impact on the tropospheric photochemistry. It might be quite interesting to investigate what is the actual agent for this (potential) ST transport. Is it a diffusion-type, average transport at MJO time scales? Or, is it related to the enhancement/reduction of frequency of shorter time-scale phenomena such as synoptic tropopause folding?

3. Fig. 9 may show double peaks around 100 hPa and around 60-50 hPa for TES and SHADOZ (Fiji), but only single peak around 100 hPa for MLS. Figs. 6 and 7 also show the similar tendency. (This might be a puzzle because MLS has much higher vertical resolution in the stratosphere and is known to give reliable measurements in the stratosphere.) But, if the double-peak feature is true, then this might mean that there are two different mechanisms for MJO-time scale ozone variability, one operating around 100 hPa and the other operating around 60-50 hPa.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 24503, 2011.