

Interactive comment on “Influence of airmass transport events on the variability of surface ozone at Xianggelila Regional Atmosphere Background Station, Southwest China” by J. Ma et al.

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First, we thank the referee for his very constructive comments and suggestions. We have revised our manuscript according to the comments and suggestions.

Response to Anonymous referee #2

General comments

The paper discusses an analysis of stratospheric intrusion of ozone-rich air masses

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detected in a two-year period at the Xianggelila background station located at high altitude in south-western China. A normalized indicator was developed to evacuate the occurrence of cases of downward transport of ozone. This is an interesting topic suitable for ACP. I have some suggestions that could be taken into account in the revision detailed in my specific comments.

Specific comments In abstract (Line 8-10). “it is show that most frequent transport events. . . .”. It is not very clear if authors intend that in winter the events are more frequent or that these events are more intense. Further, it would be possible to include a quantitative (even if approximate) estimation of the mentioned contribution.

Response: According to the results of Table 3, the occurrence of cases of the downward transport of O₃-rich air is the most frequent in winter, but the most intense event is found in June as seen in section 3.3. It seems not easy to select a threshold value of Y to get the quantitative contribution from all O₃ downward transport events. On the basis of Y larger than 4, 39% of cases of downward transport of O₃-rich air occurred in winter. An increase of O₃ caused by deep transport event is estimated as 21.0% (+9.6 ppb) in winter, by subtracting the winter average ozone level (45.8 ppb) from the average O₃ mixing ratio (55.4 ppb) in the period with both trajectories pressure level lower than 400 hPa and Y over 8. The sentence in lines 14-16 “A 9.6 ppb increase (21.0%) of surface ozone is estimated based on the impacts of deep downward transport events in winter” conveys this information. Therefore, we have moved this sentence ahead.

The Y indicator developed here is quite similar to the SI indicator developed in Cristofanelli et al. (2009) even if this last is based on Be the general idea and structure of the two indicators are similar. It would be interesting if author try including a discussion to compare the performances of the two indicators.

Response: Yes. The general idea and structure of the two indicators are similar. The seasonality of the occurrence of cases of downward transport of O₃-rich air is similar to the results of Cristofanelli et al. (2009). Both show a seasonal cycle with a winter

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maximum and a summer minimum. We have included in section 3.4 in the revised paper “The seasonal cycle of our Y indicator (see Table 3 and Fig. 6) resembles that of the SI frequency at Mt. Cimone obtained by Cristofanelli et al. (2009) using a stratospheric intrusion index. Both indicators reveal that the downward transport of upper air is strongest in winter and weakest in summer.”

In several parts of the paper it is spoken generically of “ozone transport”. I believe that it is better to specify when it is needed that it is downward transport otherwise it could be confused with advection.

Response: We agree with you. Downward transport is specified.

In section 2.2 there is a detailed description of the instruments and of the calibration procedures used. It is missing a description of the measurement uncertainties. Please add it.

Response: Yes, we have added the uncertainties of the instruments.

Section 3.3. Please change “detect limit” with “detection limit”.

Response: Accepted.

In caption of Fig. 11 Please change “bigger” with “larger”.

Response: Accepted.

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