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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The impact of monsoon outflow from India and Southeast Asia in the upper troposphere over the eastern Mediterranean" *by* H. A. Scheeren et al.

H. A. Scheeren et al.

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Comments of Anonymous Referee #2

Received and published: 3 July 2003

1. The description of the instrument characteristics needs to be cleaned up. In particular the authors may want to make sure that the sensitivity, accuracy, and time response that are quoted in the present manuscript are consistent with Traub et al.

2. The measurement list includes NO2, however, details of the NO2 measurement are missing.

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3. Vertical distribution of trace gases: It is hard to distinguish the light and dark green symbols in Fig. 2.

4. In the discussion of the air masses below 6 km the authors may want to refer to the Traub et al. paper when they mention the influence of the European emissions.

5. The trajectory shown in Fig. 4 clearly indicates the upward transport characteristic for a warm conveyor belt. However, for the trajectory shown in Fig. 4 one would not expect to see N. American pollution. The trajectory would rather suggest upward transport of a moist air mass of Caribbean origin. The timing of the upward transport will be critical in determining if this air mass is influenced by emissions over the southeastern United States or cleaner air from the North Atlantic (see also discussion in Cooper et al. of the NARE 97 flight on Sep. 26). A qualifying statement might be appropriate.

6. In Fig. 10 and 11 the measurements taken over the eastern Mediterranean are projected on the longitudinal axis of origin with the help of the trajectory calculations. How was the model sampled?

Authors Reply to Referee #2 by H.A. Scheeren

1. The description of the measurement technique for CO and NOy have been adjusted to be consisted with Traub et al. Note that the precision and accuracy of acetone, acetonitrile, and methanol were measured with a different PTR-MS (Utrecht) as compared to the results used by Traub et al. (from the MPI-C PTR-MS). This explains the different characteristics.

2. NO2 has been removed from the instrument list since it is not actually included in the data analysis.

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3. Enlarging Fig. 2. in the final manuscript should be sufficient to better distinguish the light and dark green symbols.

4. The reference 'Traub et al. (this issue)' has been included accordingly.

5. To make the analysis of the WCB-event more convincing we included additional back-trajectories to Fig. 4 and adjusted the text. The back-trajectories start in layer were the pollution plume was detected (360 - 330 hPa; 17.6 °E and 36.0 - 36.6 °N). We now write:

   - p. 2296, line 12-14: 'An example of rapid uplifting of polluted air partly originating over the southeastern United States is depicted by 10-day back-trajectories in Fig. 4..' .
   - p. 2296, line 17: 'The trajectory relates to..' changed to 'The trajectories relate to..'.
   - p. 2296, line 18: '(360 hPa)' has been included after '..about 8 km altitude'.
   - p. 2322, caption Fig. 4 changed to:

   'Backward trajectories showing rapid uplifting of boundary layer air along the North American east coast 4 to 5 days prior to the flight on August 19, 2001. The dark blue trajectory relates to the polluted air sample detected at 360 hPa, 17.6 °E and 36.6 °W. The additional light blue trajectories, ending near the polluted air mass (at 360 - 330 hPa; 17.6 °E and 36.0 - 36.6 °N), indicate the possible air mass origins with emphasis on the southeastern United States. The super-imposed cloud band along the North American east coast was taken from an infrared satellite image (GOES 8) on August 15, 2001, at 12:00 UTC associated with the WCB.'

6. The ECHAM data for comparison with the measurements have been sampled from the model output corresponding with the date, time of day (3 hours time resolution) and location (altitude, latitude and longitude) of the selected data points

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in the upper troposphere. To clarify this we included the following sentence in the introduction of chapter 6, p. 2304, line 13, before 'For more details...':

'The model data are derived from spatial and temporal interpolation using the 3 hourly T63 model output, consistent with the sample date, mean time, and location (altitude, latitude and longitude) of the selected measurements points in the upper troposphere.'

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 2285, 2003.