Atmos. Chem. Phys. Discuss., 3, S2085–S2087, 2003
www.atmos-chem-phys.org/acpd/3/S2085/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Problems regarding the tropospheric O_3 residual method and its interpretation in Fishman et al. (2003)" *by* A. T. J. de Laat and I. Aben

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Received and published: 2 December 2003

In their critique of Fishman et al. [2003], de Laat and Aben [2003] did not carefully marshall data in support of their contention that the residual method is basically flawed. A case in point is found on p. 5790, where they discuss the variability of column O3 density from the Total Ozone Mapping Spectrometer (TOMS). The TOMS column O3 data have greater variability at Samoa (14o S, 170o W) when the column O3 density is higher, which occurs near September-October. They state: ŞSamoa is considered a clean Pacific equatorial location where tropospheric O3 concentrations are generally very low throughout the troposphere, as it is remote from any major pollution source.Ť and ŞSince the variability of tropospheric total O3 column is

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small for this remote site, the high variability of the total O3 column densities must be caused by variations in the stratospheric O3 column densities.Ť Prior to the NASA Pacific Exploratory Mission Ű Tropics (PEM-Tropics), conducted in August-October 1996 [Hoell et al., 1999], the prevailing opinion was that this region was nearly pollution free. However, during PEM-Tropics, plumes of elevated ozone were frequently observed in the 4-7 km region of the troposphere near 14o S on a number of days [Fenn et al., 1999]. Fiji (18o S, 178o W) was one of the bases used during PEM-Tropics. These plumes were attributed to biomass burning in Africa and South America that were convectively lofted and transported long distances. The differential absorption lidar (DIAL) data for O3 and aerosols from a number of flights near 14o S, for 16, 26, and 28 September, 1, 3, and 5 October, are available at our web site: http://asd-www.larc.nasa.gov/lidar/petA/pemtropicsa.html. Such plumes were absent during PEM Tropics B (March-April, 1998) [Browell et al., 2001]. A biomass burn plume observed at 15.5o S, 155o W on September 5, 1996 (Figure 2 in Fenn et al. [2001]) increased the O3 column density by ˜7 DU. Such plumes easily account for the 5-7-DU seasonal excess O3 column density fluctuations shown in Figure 4 in de Laat and Aben [2003], supporting the contention that tropospheric, not stratospheric, O3 column density fluctuations explain the fluctuations in column O3 density.

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