A tropopause-related climatology of ozone profiles (TpO_3 climatology)

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The new linked climatology of ozone profiles and tropopause height (TpO_3 climatology) has been created using ozonesonde data (1980-2006) and SAGE-II satellite data (1984-2005).

The TpO_3 climatology presents ozone mixing ratio profiles on a 1 km pressure altitude grid, according to the tropopause (or double tropopauses) height. The pressure altitude z is defined as

$$z = 16 \log_{10}(1013 / P),$$

where P is pressure in hPa.

The TpO_3 climatology covers the altitude range from the surface to ~60 km.

The climatology is organized as a collection of folders corresponding to the latitudinal zones of 10° (self-explained names, e.g., '10N_20N'). Each folder includes 12 files in ASCII format corresponding to 12 months. For example, for January the file name is "01.dat" for single tropopauses and "01_double.dat" for double tropopauses (if present). The reported tropopause heights (in km) always present the lower limit of the 1-km interval. For example, the tropopause height of 16 km reads that the tropopause is in the interval 16-17 km.

The probability distribution of tropopause heights (i.e., the percentage of observations having tropopause heights in the corresponding 1 km bins) is also provided. For example, in the file 0N_10N/01.dat, the record

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"Tropopause height (lower limit of 1-km bin):       16      17
Tropopause height frequency:  80.444  19.556"
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denotes that the tropopause in the interval 16-17 km has occurred in 80.444% of observations, and the tropopause in the interval 17-18 km is observed in 19.556 % of the analyzed measurements.

The double tropopauses are characterized for latitudes 30°-40°N from January to March. The structure of the ASCII files for double tropopauses is very similar to that for single tropopauses.

The details of the data analysis can be found in:

Sofieva, V. F., Tamminen, J., Kyrölä, E., Mielonen, T., Veefkind, P., Hassler, B., and Bodeker, G. E.: A novel tropopause-related climatology of ozone profiles, Atmos. Chem. Phys. Discuss., 13, 21345-21382, doi:10.5194/acpd-13-21345-2013, 2013.

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