

Bodeker Scientific Global Vertically Resolved Ozone Database

Background Information

Bodeker Scientific produces a combined monthly mean vertical ozone profile database spanning the period 1979 to 2007. The database is completely filled such that there are no missing data. A publication describing the construction of this database is currently in preparation.

The raw individual ozone data are sourced from the Binary DataBase of Profiles ([BDBP](#)).

Monthly means are calculated from individual ozone measurements extracted from the BDBP in much the same way as in Hassler et al. (2009). These are referred to as Tier 0 data. A regression model is fitted to the Tier 0 data at each of 70 pressure/altitude levels. The regression model is of the form:

$$\begin{aligned} \text{Ozone}(t, \text{lat}) = & A(t, \text{lat}) + && \text{Offset and seasonal cycle} \\ & B(t, \text{lat}) \times t + && \text{Linear trend} \\ & C(t, \text{lat}) \times \text{EESC}(t, \text{AoA}) + && \text{Age-of-air dependent equivalent} \\ & && \text{effective stratospheric chlorine} \\ & D(t, \text{lat}) \times \text{QBO}(t) + && \text{Quasi-biennial Oscillation} \\ & E(t, \text{lat}) \times \text{QBOorthog}(t) + && \text{Orthogonalized QBO} \\ & F(t, \text{lat}) \times \text{ENSO}(t) + && \text{El-Niño Southern Oscillation} \\ & G(t, \text{lat}) \times \text{Solar}(t) + && \text{Solar cycle} \\ & H(t, \text{lat}) \times \text{Pinatubo}(t) + && \text{Mt. Pinatubo volcanic eruption} \\ & R(t) && \text{Residual} \end{aligned}$$

Regression model fit coefficients are expanded in Fourier series to account for seasonality and in Legendre polynomials in latitude to account for meridional structure in the fit coefficients.

Regression model output is then used to produce 4 gap free Tier 1 data sets, viz.:

- Tier 1.1 (Anthropogenic): This comprises the mean annual cycle plus contributions from the EESC and linear trend basis functions.
- Tier 1.2 (Natural): This comprises the mean annual cycle plus contributions from the QBO, solar cycle and El Niño basis functions.
- Tier 1.3 (Natural & volcanoes): Tier 1.2 but now also including contributions from volcano basis functions.
- Tier 1.4 (All): Constructed by summing the contributions from all basis functions.

Data availability and file format explained

The Ozone database is stored in the [Bodeker Scientific Ozone data archive](#) at CEDA.

There are 20 files available named

CCMVal2_REF-B1_BSOzone-XX-YYY_TierZZ_T2Mz_O3.nc

where:

- CCMVal2 indicates that these data files have been formatted to allow easy use in the [CCMVal2](#) project.
- REF-B1 indicates that the time period covered is similar to that for the REF-B1 simulations.
- XX is either 'MR' for mixing ratio or 'ND' for number density.
- YYY is either 'PRS' to denote that the data are on pressure levels or 'ALT' to denote that the data are on altitude levels.
- ZZ denotes the Tier: '0', '1_1', '1_2', '1_3' or '1_4'.
- T2Mz denotes that these are monthly means in two dimensions (latitude and altitude/pressure).

File format is NetCDF.

Further references

A publication describing the construction of this database is currently in preparation.

Hassler, B., G. E. Bodeker, I. Cionni, and M. Dameris (2009), [A vertically resolved, monthly mean, ozone database from 1979 to 2100 for constraining global climate model simulations](#), *International Journal of Remote Sensing*, 30(15-16), 4009–4018.

The [Binary DataBase of Profiles \(BDBP\)](#) database at NIWA. BDBP is a database of trace gases and aerosols with near global coverage derived from high vertical resolution profile measurements.