



Improved Multi Sensor Reanalysis of Total Ozone for the period 1970-2012

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The upgrade of the ozone multi-sensor reanalysis (MSR2) is a multi-decadal ozone column analysis based on all available ozone column satellite datasets, surface Brewer-Dobson observations and a data assimilation technique with detailed error modelling. The result is a high-resolution time series of 6-hourly global ozone column fields that may be used for trend analyses as well as detailed case studies.

The ozone MSR2 is produced in two steps. First, the latest reprocessing versions of all available ozone column satellite datasets are collected, and are corrected for biases as function of solar zenith angle, viewing angle, time (trend), and stratospheric temperature using Brewer/Dobson ground measurements from the World Ozone and Ultraviolet Radiation Data Centre (WOUDC). Subsequently the debiased satellite observations are assimilated within the ozone chemistry and data assimilation model TMDAM driven by meteorological analyses of the European Centre for Medium-Range Weather Forecasts (ECMWF).

In the MSR2 upgrade, the ozone reanalysis is produced for the extended period 1970-2012. Several improvements have been implemented in the chemistry-transport model and data assimilation system to improve the error modelling and processing speed. For the period 1970-1977 BUV satellite observations have been included, and the total record is extended with 13 years compared to MSR1. The latest total ozone retrievals of 15 different satellite instruments are used: BUV-Nimbus4, TOMS-Nimbus7, TOMS-EP, SBUV-7, -9, -11, -14, -16, -17, -18, -19, GOME, SCIAMACHY, OMI and GOME-2. The observation-minus-forecast (OmF) departures from the data assimilation show that the mean bias of the MSR2 analyses is less than 1 percent with respect to debiased satellite observations after 1979.