

Combining regional and temporally limited measurements of stratospheric chemical composition into a global database

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A database of trace gases and aerosols with near global coverage derived from high vertical resolution profile measurements, has been assembled as a the "Binary DataBase of Profiles" (BDBP). Version 2.0 of this database will be released in October 2011. The database includes measurements from different satellite- (HALOE, POAM II and III, SAGE I and II, ILAS and ILAS II, LIMS) and ground-based measurement systems (ozonesondes). In addition to the primary product of ozone, the database contains secondary measurements of other trace gases, aerosol extinction, and temperature. All data are subjected to very strict quality control and for every measurement a percentage error on the measurement is included. To facilitate analyses, each measurement is added to five different instances of the database where measurements are indexed by: (1) geographic latitude, longitude, altitude (in 1 km steps) and time, (2) geographic latitude, longitude, pressure (at levels about 1 km apart) and time, (3) equivalent latitude, potential temperature and time, (4) geographic latitude, longitude, altitude relative to the local tropopause and time, and (5) geographic latitude, longitude, pressure relative to the local tropopause and time. Because the original measurements are provided rather than derived monthly means, the BDBP is applicable to a wider range of analyses than databases containing only zonal mean monthly mean data. However, combining BDBP data from different sources to derive long-term data records suitable for trend detection, requires a careful treatment of drifts in individual time series, offsets between different data sources, and differences in temporal and spatial sampling. Techniques to homogenize data from multiple sources in the BDP are presented. For example, one approach is to select one data source as an initial standard and measurements from all other sources are successively compared to coincident measurements from the standard, to derive and correct for temporal and spatial biases. The corrected database is then merged with the standard to produce an extended standard.