



The PROMOTE ozone profile service: Long-term 3D ozone reanalysis of ERS-2 and ENVISAT data sets

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Data Assimilation of historical ozone satellite observations for vertically resolved global analysis of stratospheric ozone has been recently established as a service element within ESA's GSE project PROMOTE (PROtocol MOniToring for the GMES Service Element). It aims at fostering a better understanding of stratospheric processes related to ozone depletion. The service will be built on four-dimensional variational assimilation (4Dvar) systems at DLR and BIRA-IASB. Data from UARS, ERS-2 and ENVISAT atmospheric instruments will be used to construct a continuous record starting in 1992.

Estimates of the chemical state by chemical data assimilation strongly depend on quality issues regarding the underlying model and the applied observing systems. However, geophysical validation for long-term historical data records is hampered by the very limited available independent (not-assimilated) observations. For example, ground-based data can only provide a limited number of test sites. In preparation of PROMOTE, we therefore investigate how far the reliability of assimilation products can be assured by existing observing networks and satellites. Facing areas with temporarily or permanent missing data coverage, it is also of interest to apply assimilation derived statistical error measures like first-guess and analysis errors.

We present first results of long-term sequential assimilation of GOME ozone observations using the ROSE/DLR chemistry-transport model. The presented data will cover characteristic Northern and Southern hemispheric spring episodes from 1996 until 2003 to highlight chemical and dynamical ozone depletion over the polar regions. We will discuss the consistency of assimilation results in comparison to a free model run and independent observational data from MLS, HALOE and MIPAS instruments.