Global Ozone Analyses by Assimilating SCIAMACHY and GOME Observations into a 3D CTM

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O3 Profiles = Observations + Modeling

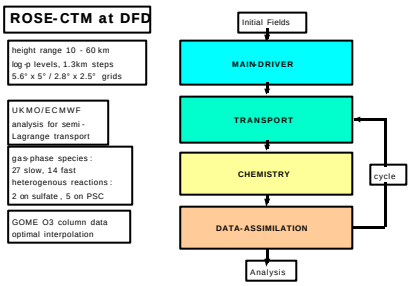
ERS 2-GOME is providing information about the atmospheric column content of O3 and NO2 routinely since April 1995. To answer questions relevant to atmospheric climatology, however, informations on vertical trace gas distribution and their variability are also required. As prestudies have shown it is possible to gain ozone profiles from GOME column data with the help of the chemistry transport model ROSE with good quality. For this GOME data are used as an additional boundary condition during the simulation. Unlike the direct inversion techniques the method is fast and permits a high spatial and temporal resolution. In addition one receives important information about related trace gases as well as for the chemical ozone loss processes.

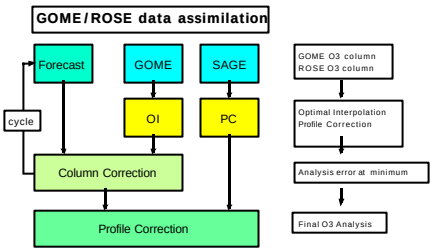
NCAR ROSE* chemistry module

*Brasseur, 1996 withJPL 2000 update

Transported species		Equilibrium species
Ox	HO2NO2	O(1D), O(3P)
(O(1D)+O(3P)+O3)	CO	O3
H2O2	BrOx (Br+BrO)	O2*
H2O[2]	HBr	H
NOx (NO+NO2)	HOBr	OH
NOy (N+NO)	BrONO2	HO2
N2O	H2SO4[3]	NO
N2O5		N
HNO3[2]		NO2
HNO4		NO3
ClOx (CH3ClO)		N2*
Cl2O2		Cl
OClO		ClO
Cl2[2]		Br
ClNO2[2]		BrO
ClONO2		BrCl
HCl		H2*
HOCl[2]		CFC-11, CFC-12
CH4		

[2] PSCs (Chipperfield, 1994)
[3] Aerosols
*constant 2-D field





GOME-ROSE NRT Service

Aim of the BMBF's AFO2000 project INVERT is the production of a solid data set under use of all available GOME observations. Therefor an operative GOME rose processor was developed and implemented at the DLR-DFD in cooperation with the University of Cologne, the Max-Plank institute for Meteorology and NCAR (National Center for Atmospheric Research) used to derive vertically resolved ozone distributions in near real time.

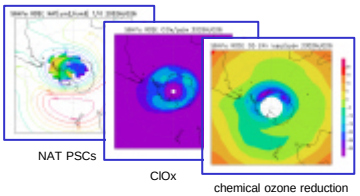
This NRT Service provides daily ozone profiles and analysis of stratospheric ozone chemistry since beginning of 2001. Using the model information of the tropospheric NO_2 content will also be derived, by substracting the models stratosphere from GOME observations.

Data are available from the World Data Center for Remote Sensing of the Atmosphere, WDC-RSAT (**http://wdc.dlr.de**).

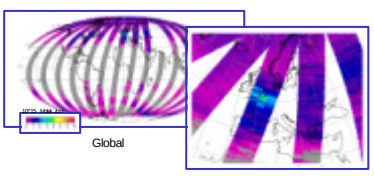
Data assimilation and Validation

GOME measurements of total column ozone, produced at the German Remote Sensing Data Center of the German Aerospace Center (DLR-DFD) operationally are distributed inhomogeneously in time and space. Global coverage is achieved within three days. GOME total ozone columns are assimilated sequentially into the ROSE model using optimal interpolation with prescribed errors for GOME (4%) and model column values (18%). Thus the models horizontal and vertical ozone distribution changes characteristically according to column observations. Up to March, 2003 an additional bias correction was applied based on a SAGE II climatology. Extensive validations using ground based (WODC) and satellite instruments SAGE-II, MLS, HALOE) are presently running.

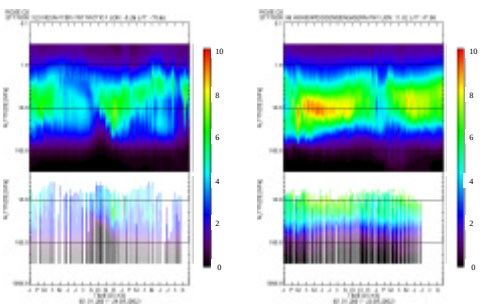
Analysis of stratospheric ozone chemistry



Tropospheric NO2-column = GOME - Modell



Comparisons with ozonesondes 2001/2002



Station Neumayer

Station Hohenpeissenberg

APPLIED REMOTE SENSING CLUSTER