science softCon

DUST 1.5: Interactive data visualization

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DUST 1.5:

The DUST 1.5 software (Data Utilization Software Tools) was developed for interactive data visualization and processing of level 3 atmospheric data and is based on the public domain DUST-1 software package, which was developed on behalf of the German Remote Sensing Data Center (DFD) at DLR. **Dust 1.5 is the status of DUST 2 in April 2000.**

In addition to the DUST-1 software, DUST 1.5 contains a complementary search tool (S^4) and a linkage via a HTML-interface to the TOSCANA software. This allows a more selective data search and the combination between alphanumerical data (texts) and numerical data (measurements).

The software focuses on providing software for processing level 3 data available from the GOME (Global Ozone Monitoring Experiment), TOMS (Total Ozone Mapping Spectrometer) and MAS (Millimeter-wave Atmospheric Sounder) instruments. A calendar tool as well as the S^4 search-tool makes it easy to search for desired data sets on the CD-ROM. Different data formats (ASCII, HDF) are taken into account.

The software functionality includes visualization, animation, and mathematical/statistical processing of the data sets. Thus, GOME or TOMS total ozone column densities can be displayed in either epicylindrical or spherical projections. It is possible to zoom into the projection or to enlarge spatially defined excerpts, whereby the cursor shows the location (latitude/longitude) and the Dobson Units in a special window. The spherical projection can be rotated in any direction. For MAS data, which supplies the altitude profiles of various atmospheric trace gases like ozone and water vapor, the software offers in addition to the zoom and excerpting functions the possibility of directly viewing the profile at a desired altitude interval, or of examining the entire profile structure by scanning through all the altitude intervals.

By sequencing data sets which extend over a predefined period, temporal and spatial animation is possible. After their generation, the resulting video animations can be stored for future use, such as for presentations.

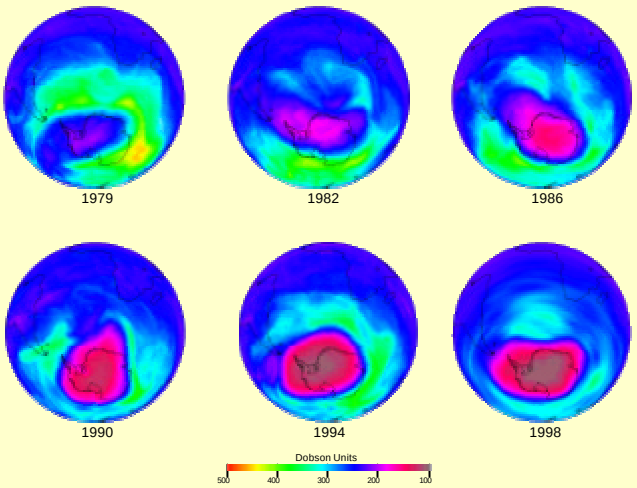
Mathematical/statistical processing of the data sets makes it possible to reveal climate trends, such as monthly means, or to ascertain the differences between two data sets, for example how the monthly mean total ozone column densities of September 1995 and September 1999 vary. This supports prediction activities within the (given) uncertainty for local, regional and global changes and trends and supports related risk assessments.

Future activities include the linkage between the SUVDAMA Database and the DUST-Visualization Tool.

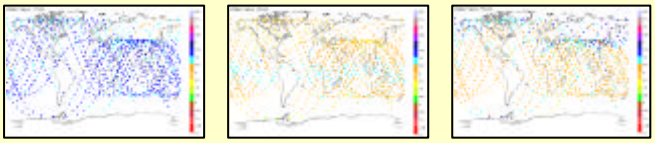
The data base for DUST 2 will contain the following data:

- ozone data from various instruments (GOME, TOMS, MAS)
- water vapor data (MAS)
- ClO data (MAS)
- UV-B data from the SUVDAMA Database
- TEC and Space Weather data

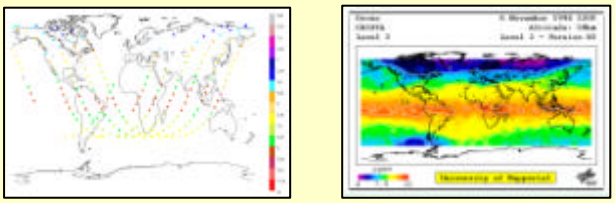
Southern hemisphere monthly mean ozone data (TOMS/GOME; October) processed and visualized with DUST:



Water vapor and ozone data measured by MAS and CRISTA in ppmv



ATLAS-1 MAS water vapor data measured at different altitudes in March 1992 (17 km, 38 km and 59 km)



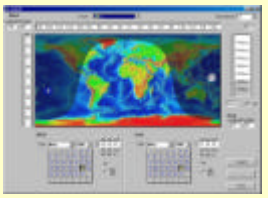
MAS and CRISTA ozone data measured during ATLAS-3 mission (November 1994) at 29 km and 30 km altitude

For more information see: www.linmpi.mpg.de/english/projekte/masnew
www.crista.uni-wuppertal.de
auc.dfd.dlr.de

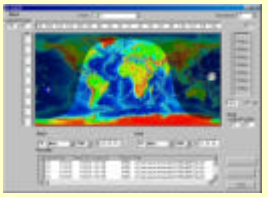
S^4 Tool

The comparability of data sets from different sources depends strongly on the degree in coincidence in time and space (co-location, co-time). The better the different data are co-located and co-timed the less unreliable the data validation will be. The S^4 tool allows to search for comparable data (ozone and water vapor) from GOME, TOMS and MAS within a given data base. The search-window in space and time can be varied by the settings of the S^4 tool. The upper limit of the window-size for a meaningful comparison varies according to the research question.

The S^4 tool allows the 4dimensional search (timely and spatially) for ozone and water vapor data. The period of time can be selected via the calendar and the location (latitude, longitude and altitude) via the location-windows.



The search results are listed in the results-window and can be opened and visualized directly from this list.

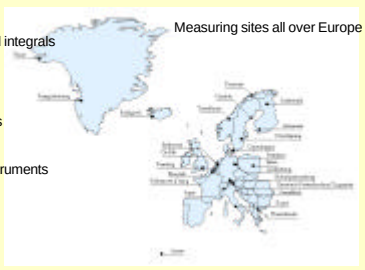


UV DATABASE - A uniform European data format for spectral UV and broadband instruments

Developed in the framework of the EU project **SUVDAMA** - **S**cientific **UV DA**ta **MA**nagement

The SUVDAMA Database includes

- high quality radiation data from several spectroradiometers, multifilter radiometers, broadband instruments, Luxmeters, and Pyranometers located at measuring sites all over Europe
- ancillary data such as meteorological parameters, total ozone concentration, cloud parameters, etc.
- optimized database structures, data submission channels and tools, data management programs and data users' tools
- Quality Assurance/Quality Control Tools
- software interface for calculating weighted integrals (e.g. erythemal UV), daily doses,..



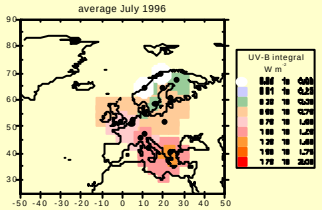
Measuring sites all over Europe

METADAMA linked to the main database provides

- information about measuring sites and instruments
- description of calibration procedures
- specification of uncertainties

The uniform data format enables

- fast and easy access to high quality UV radiation data
- comparisons between European monitoring sites
- determination of trends of biologically weighted UV, daily UV doses, and seasonal trends
- geographically interpolated UV measurements



Example of a composite map of solar UV-B irradiance generated from spectral data included in the database

worked out by A. Bais and K. Tourpali
Laboratory of Atmospheric Physics, Thessaloniki/Greece

Future Plans - Link between the SUVDAMA Database and the DUST-Visualization Tool

→ Visualization of the UV measurements and the ancillary data

→ Combination with other measurements, e.g. satellite observations of the total ozone content

The research activities and data collection will be continued within the EU-project **EDUCE** - **E**uropean **D**atabase for **U**ltraviolet Radiation **C**limatology and **E**valuation

Further information at http://ozone.fmi.fi/SUVDAMA

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