Ozone Data Quality Assessment (O3S-DQA) in a Historical Perspective: Resolving inhomogenities in long term ozone sounding records and assessing their uncertainties

Smit, Herman G.J.(1), Samuel J. Oltmans (2) and O3S-DQA Panel

(1) Research Centre Jülich, Institute of Energy and Climate Research: Troposphere (IEK-8), 52425-Juelich, Germany (Contact: Email: h.smit@fz-juelich.de / Fax: +49-2461-618121)
(2) NOAA/ESRL Global Monitoring Division, Boulder CO 80305, USA (Email: samuel.j.oltmans@noaa.gov)

Ozone sounding records constitute the longest time series of the vertical ozone distribution between the surface and 30-35 km altitude. Up to an altitude of 20 km ozone sondes provide the single data source with long term coverage for the derivation of ozone trends with sufficient vertical resolution, particularly in the altitude region around the tropopause. The presentation will start by giving first a brief overview about the different ozone sonde types deployed nowadays and discuss, in a historical perspective, their specific performance characteristics in terms of precision and accuracy as a function of altitude.

We will demonstrate that intercomparisons like JOSIE and BESOS, but also dual balloone soundings, have clearly shown that even small differences of sensing techniques, sensor types or sensing solutions can introduce significant inhomogenities in the long term sounding records between different sounding stations or within each station individually. To resolve these artifacts long term sounding records have to be homogenized either in space (between different stations) or in time (long term changes) through use of generic transfer functions which can be derived from intercomparisons (e.g. JOSIE or BESOS), dual balloon soundings and laboratory experiments. In this context the Ozone Sonde Data Quality Assessment (O3S-DQA) has been started in 2012 and is still on-going

The major goal of the O3S-DQA activity is the homogenization of a selected ozone sonde data sets. An essential aspect of this assessment is the estimation of expected uncertainties and the detailed documentation of the reprocessing of the long term ozone sonde records of the participating sounding stations. The aim is to reduce uncertainties between long term sounding records from 10-20% down to 5-10% through the use of generic transfer functions. We will present briefly the methodology followed but will focus on the results obtained before and after the homogenization process. We will discuss to what extent the use of these generic transfer functions has homogenized long term sounding records and have reduced their uncertainties.

(3) O3S-DQA panel:

Geir Braathen	WMO Environment Division, Switzerland
Wolfgang Steinbrecht	Meteorological Observatory Hohenpeissenberg, Germany
Jonathan Davies	Environmental Canada, Canada
Terry Deshler	University of Wyoming, USA
Bryan Johnson	NOAA GMD, USA
Rigel Kivi	Finnish Meteorological Institute (FMI), Finland
Samuel Oltmans	CIRES, University of Colorado and NOAA GMD, USA
Frank Schmidlin	NASA Wallops Flight Facility, USA
Herman Smit	Research Centre Juelich, Germany
Rene Stubi	MeteoSwiss/ Payerne Station, Switzerland
David Tarasick	Environmental Canada, Canada
Anne Thompson	NASA/Goddard Space Flight Center, USA
Roeland Van Malderen	Royal Meteorological Institute of Belgium (RMI), Belgium
Jacquelyn Witte	SSAI at NASA Goddard Space Flight Center, USA