

The Jülich Ozone Sonde Intercomparison Experiment is a WMO (= World Meteorological Organization) activity towards implementing a global quality assurance plan for ozone sondes in routine use today around the world to watch global changes of ozone in the troposphere and stratosphere.

In order to assess the performance of the different types of ozone sondes the environmental simulation chamber at the Forschungszentrum Jülich (Germany) is established as World Calibration Center for Ozone Sondes (WCCOS). The simulation chamber enables control of pressure, temperature and ozone concentration and can simulate flight conditions of ozone soundings up to an altitude of 35 km., whereby an accurate UV-photometer serves as a reference.

## **JOSIE - Background**

The main driving force of global atmospheric observations and atmospheric chemistry research is the need to develop sound environmental policy related to the following questions: What is the effect of human activity on stratospheric and tropospheric ozone? How is the UV flux at the surface of the Earth changing in response to changes in the ozone column density? How is surface climate sensitive to the atmospheric concentrations of greenhouse gases and aerosols, and what factors control these concentrations? How is the oxidizing power of the atmosphere changing with time, and what is the influence of human activity? How is regional air quality degraded by industrial and other anthropogenic emissions in populated areas of the world?

The answers to these questions are provided--in part--by WMO-GAW and IGAC-GLONET, and the resulting data sets are used by policy makers to resolve major scientific issues. It is therefore imperative that all data be obtained by strict adherence to comprehensive quality assurance programmes. The Quality Assurance/Science Activity Centres (QA/SACs) design and execute these quality assurance programs.

The Global Atmosphere Watch (GAW) program is a coordinated network of observing stations, associated facilities and infrastructure encompassing measurement and related scientific assessment activities. The overall role of GAW is to supply basic information of known quality indicative of the atmospheric environment that transcends specific issues (Global Atmosphere Watch Guide, GAW Report No. 86, 1993).

Up to an altitude of about 20 km ozone sondes constitute the single most important data source with long term data coverage for the derivation of ozone trends with sufficient vertical resolution, particularly in the important altitude region around the tropopause. Furthermore, in the lower/middle stratosphere up to 30-35

km altitude ozone sondes are of crucial importance to validate and evaluate satellite measurements for long term stability assessments.

The state of knowledge regarding long term trends of tropospheric as well as stratospheric ozone is limited due to a limited global coverage of ozone sounding stations, poor assurance of continuity of data and questionable homogeneity of data (WMO Scientific Assessment of Ozone Depletion, 1995, 1999). Particularly, there is an urgent need for improved data quality which must be achieved by intercalibration and intercomparison of existing ozone sonde types as well as agreement on procedures for data processing and analysis (SPARC-IOC-GAW, Assessment of Trends in the Vertical istribution of Ozone, 1998).

Despite the fact that during previous series of WMO-intercomparisons in the field (Attmannspacher et al., 1970, 1981, and Kerr et al., 1994), where several different types of ozone sondes were simultaneously flown, many questions with regard to the observed instrumental performance of the different ozone sondes were left unanswered. A key shortcoming was that in most intercomparisons no ozone reference standard was simultaneously flown. Several national and international efforts are underway towards building a representative global network of ozone sonde stations. WMO-GAW and IGAC-GLONET are committed to support such efforts. However, prior to any expansion, and in order to optimize the use of existing networks for accurate measurements of tropospheric O3 profiles, it is absolutely essential that certain tasks be accomplished: Intercalibration and intercomparison of existing ozone sonde types; Agreement on measurement frequency and timing; Agreement on procedures for data processing and analysis. The short-term objectives of this task are: (1) to bring together from around the world scientists from the current ozone sonde measurement programs, and (2) to compare instrument performance in a controlled environment and, thus, determine the accuracy and other characteristics influencing data comparability of the field instruments. The long-term objective is to establish a permanent facility for ozone sonde intercomparison and calibration.

In order to assess the performance of the different types of ozone sondes used within GAW (=Global Atmosphere Watch) and GLONET (=Global Ozone Network) the environmental simulation chamber at the Forschungszentrum Jülich (Germany) is established as World Calibration Center for Ozone Sondes (WCCOS) since 1996. The simulation chamber enables control of pressure, temperature and ozone concentration and can simulate flight conditions of ozone soundings up to an altitude of 35 km [*Smit et al.,* 1998, 2000]. A controlled environment plus the fact that the ozone sonde measurements can be compared to an accurate UV-photometer as a reference [*Proffitt and McLaughlin,* 1983] are essential elements for addressing questions that arise from previous field intercomparisons.

The Jülich Ozone Sonde Intercomparison Experiment (JOSIE) started in 1996 is a GAW-GLONET activity towards implementing a global quality assurance plan for ozone sondes in routine use today around the world.

## References

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## **Environmental Simulation Facility To Calibrate Airborne Ozone and Humidity Sensors**



Platform to investigate and compare the performance of airborne ozone and humidity sensing devices against accurate reference instruments under realistic atmospheric conditions

## Link to the JOSIE webpage: http://www2.fz-juelich.de/icg/icg-2/josie/