Introducing the WMO GAW World Calibration Centre for Nitrous Oxide

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Because N_2O was included in the Global Atmosphere Watch (GAW) measurement program recommended for global stations, the establishment of a World Calibration Centre for Nitrous Oxide (WCC-N_2O) became necessary, as outlined in the WMO/GAW Strategic Plan 2001-2007. The WCC-N_2O within GAW will maintain global calibration standards, perform system and performance audits as well as round-robin experiments, and support network-wide quality review. By its activities, the WCC-N_2O aims at improving the data quality in the network and at harmonizing the results from different stations and monitoring programs in order to increase the global N_2O data coverage. The buildup of the WCC-N_2O began in 2001, and in November 2002 this GAW facility became operational at the Institut für Meteorologie und Klimaforschung/Atmosphärische Umweltforschung (IMK-IFU). The activities are conducted under supervision of the Quality Assurance/Science Activity Centre (QA/SAC) Germany, operated by the German Environmental Agency (UBA).

The NOAA/CMDL N_2O calibration scale was chosen as reference for the GAW network (Figure 1). Therefore, a set of five cylinders (N_2O concentration range 260-360 ppb) was acquired from CMDL to serve as laboratory standards at the WCC for the calibration of transfer standards. A first series of the five cylinders has been calibrated, and at present a second set is in preparation at the WCC-N_2O. It is intended to conduct one round-robin intercomparison experiment per year involving all global stations that measure N_2O. Furthermore, the WCC-N_2O will promote intercomparison experiments with laboratories related to other programs. A draft of a N_2O Standard Operating Procedure (SOP), including audit procedures, has been compiled by the WCC and is currently being discussed. A major point is the definition of refined Data Quality Objectives (DQO), because previous guidelines for N_2O measurements within GAW, as listed in WMO-GAW Report No. 80, request only 2% accuracy and an instrument precision of 1%.

So far, a system and performance audit has been performed by the WCC-N_2O at two stations, one of regional and the other of global GAW status. Thereby, several crucial points related to N_2O measurements came to the fore, notably, the concentration range needed for characterizing the detector response, problems with CO_2 interference, and the total number of components in gas mixtures used for intercomparisons and audits. On all issues related to DQOs, definite recommendations of the GAW Scientific Advisory Group for Greenhouse Gases (SAG GG) will be needed as a basis for the future work.

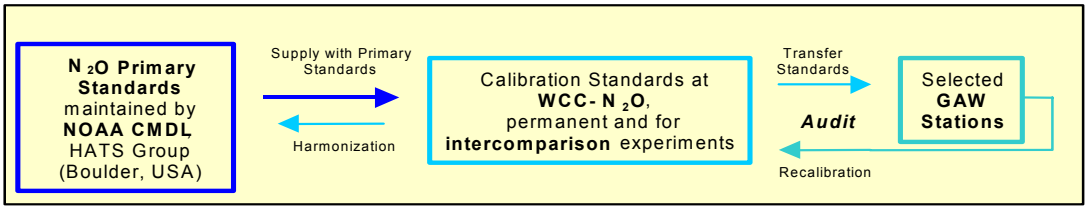

Figure 1. Procedure for traceability of calibration and audits.