

Data Quality Objectives for stable isotopes in greenhouse gases: current status and future needs.

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GAW-Data Quality Objectives (DQOs) are based on the requirements related to the meaningful use of the data. For stable isotopes in greenhouse gases, DQOs mean metrological compatibility of the data obtained at different labs, stations and in different years (discrepancies not larger than XXX). This in turn implies correctness of calibrations (no lab-to lab biases in calibrations) as well as the long-term consistency (no drifts) of the isotope scales themselves which are currently based on artefacts. All that can be achieved based on the proper use of high quality Reference Materials (RMs) only. All in all DQOs may be considered as the combined uncertainty requirements, which includes (i) uncertainty of the reference materials in use, including primary RMs, (ii) uncertainty of lab' calibrations and (iii) typical (averaged) uncertainty due to sampling and measurements.

In particular DQOs for delta-13C give values (0.01 permil for air CO₂ and 0.02 permil for air methane) which are hardly possible to reach in practice as the combined uncertainty, even by using the best analytical instruments. The situation needs a revision and potentially adapting approaches as developed in other areas.

This presentation aims to start the stable isotope section at the meeting. This will also review the most critical aspects and introduce topics for discussion as following:

- Components of uncertainty. Why in some cases increased number of measurements cannot improve the uncertainty anymore?
 - 2-point data normalisation on the delta-13C scale aimed at the scale consistency - implications for the uncertainty propagation;
 - Uncertainty needed for reference CO₂-mixtures;
 - Uncertainty reported by end-users: to be propagated to the scale level, based on the combined uncertainty of RMs in use (including reference CO₂-mixtures).
 - Which components of uncertainty are relevant to DQOs?
 - Recommendations / SOPs on the use of reference mixtures and performing measurements at user-labs;
 - Quality Assurance and Quality System at all levels (RM providers, CCL, analytical labs);
 - Future and developments.