

Name of research institute or organization:

Max Planck Institut für Biogeochemie, Jena

Title of project:

Flask comparison on Jungfraujoch

Project leader and team:

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Project description:

The European project IMECC (Infrastructure for Measurements of the European Carbon Cycle) includes an activity called Transnational Access (TA). It is designed to enable high-precision measurements to be made across EU wide research institutions and, thus, to broaden and improve access to European Carbon Cycle measurement facilities. One of these facilities is the Research Station at Jungfraujoch.

MPI-BGC Jena has submitted a proposal to get access to this research station which was approved in 2008. The goal behind this TA activity is to compare CO₂ and O₂ concentrations of air samples taken simultaneously at Jungfraujoch station via combined flask filling. The Jena MPI has supplied the research station at Jungfraujoch with an flask sampling unit of the typical MPI-BGC design. This is run in conjunction to the Groningen (project Rolf Neubert, Groningen) as well as UBern (project Markus Leuenberger, Bern) flask sampling programmes.

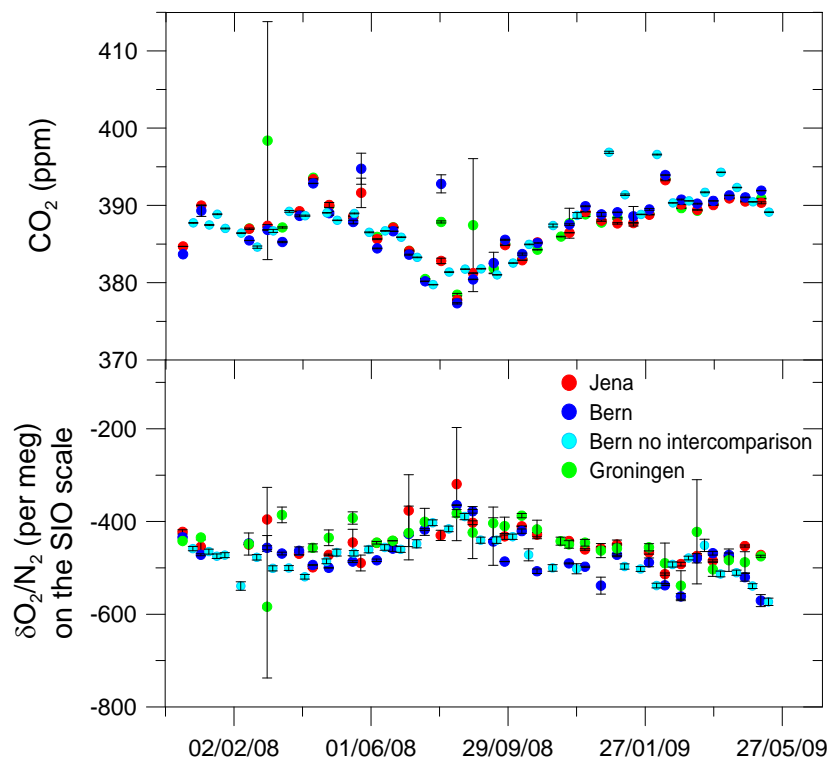


Figure 1: Measurement comparison of CO₂ and O₂/N₂ between MPI-BGC Jena, CEP UBern and CIO Groningen.

Figure 1 presents results from the first 1.5 years of operation. The three laboratories capture the seasonal cycle as well as the absolute values consistently, confirming that both scales are well adjusted and have not drifted significantly during the comparison period. However, a number of issues regarding inconsistencies of the measurements became apparent in both species. The inter-laboratory differences are larger for O₂/N₂ than for CO₂, reflecting the enhanced challenge to capture the small O₂/N₂ variations, expressed in units of 10⁻⁶ or per meg (~4.8 per meg correspond to one O₂ ppm-equivalent, which must be quantified versus the large 21% O₂ background). The sampling procedure was adjusted several times since it became clear that a precisely simultaneous flask filling was difficult to manage, owing to the different requirements of sampling volume and air pressure. The MPI-BGC Jena flask request a sampling pressure of about 1600 mbar whereas the Groningen and UBern flask are filled to about 960 mbar. Therefore, it was decided to fill the Jena flask separately from the Groningen and UBern flasks, which are filled together. However, the time of sampling remains the same for all flasks. Combined sampling is made every second week.

Key words:

Flask measurements, inter-comparison, oxygen and carbon dioxide measurements, Greenhouse gas

Collaborating partners/networks:

IMECC partners

Scientific publications and public outreach 2010:

Refereed journal articles

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