

The Monitoring Network of the MPI for Biogeochemistry, Jena for Atmospheric Greenhouse Gases, Oxygen and Their Isotopic Signatures

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Since 2004 the MPI for Biogeochemistry has been developing a small network of atmospheric monitoring sites for biogeochemically relevant species. The network currently comprises 8 sites and 2 has sites under construction (Figure 1). Locations of the sites were chosen based on: (1) filling critical gaps in the global *in situ* observational network and, (2) close to biogeochemical “hotspots” in view of regional climate variability and future trends, such as Siberia, Amazonia and the subtropical upwelling regions off the west coast of Africa. Six sites include quasi-continuous measurements of atmospheric greenhouse gases (GHGs), 4 of which are augmented by continuous O₂/N₂ instruments. A comprehensive flask sampling program for quality control and isotopic analyses is performed at all sites. Here we report primarily on the flask observations. Pressurized 1-l glass flasks (1.6 bar) are routinely taken weekly or bi-weekly at all sites in triplicates for quality control and subsequently analyzed at the MPI for Biogeochemistry for CO₂, CO, CH₄, N₂O, H₂, SF₆, ¹³C and ¹⁸O in CO₂ and the O₂/N₂ and Ar/N₂ ratio. Oxygen fractionation effects caused by micro-leaks during extended storage times before analysis are corrected by normalization to a constant Ar/N₂ ratio, which significantly reduces the scatter of the O₂/N₂ measurements of flask replicates. Comparison of the flask observations from the Alert Station shows a reasonable agreement with flask measurements from other monitoring agencies. Figure 2 shows as an example the complete record from the flask sampling site located at Sumburgh Head on the southern tip of the Shetland Islands (60.28N, 1.28W). The rather large scatter of the CH₄ measurements is most likely caused by gas leaks from oil platforms in the nearby ocean. Several of the records have already been used in modeling studies; the complete record is available upon request and is also currently being incorporated into the World Data Center for GHGs.

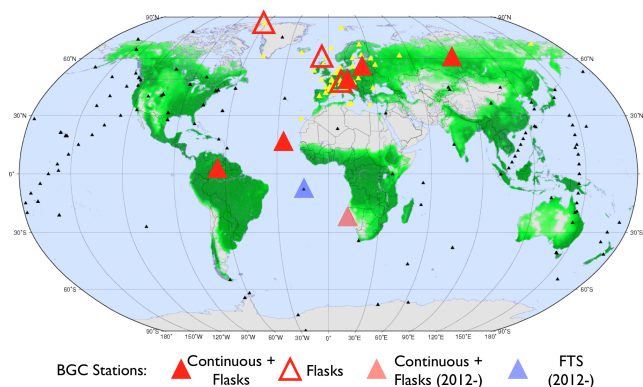


Figure 1. Map of the monitoring network of the MPI for Biogeochemistry. The Ascension Island Station in the South Atlantic will only be instrumented by a Fourier Transformation Spectrometer in 2012.

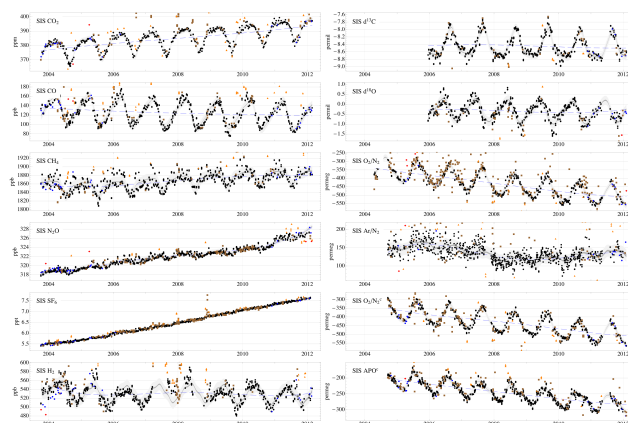


Figure 2. Complete flask measurements from the Shetland Islands station (60.28N, 1.28W) analyzed at the MPI for Biogeochemistry. The colors of the symbols represent quality/representativity indicators: a black circle indicates a good flask measurement from a good replicate. The fitted lines (seasonal cycles and trends) are for display purposes only.