

Name of research institute or organization:

Departement Umweltwissenschaften, Universität Basel

Title of project:

Baseline characterisation of air masses using radon-222

Part of this programme:

ICOS

Project leader and team:

Dr. Franz Conen, project leader

Mr. Lukas Zimmermann

Dr. Alastair Williams

Dr. Alan Griffiths

Dr. Scott Chambers

Project description:

Our radon-222 detector provided good quality data throughout the year 2016. The contamination issue we faced between 2013 and the end of 2015 was definitively solved by moving the detector to its new location in autumn 2015 (see Activity Report 2015). Still preliminary data for the last 2 ½ months of 2016 will be bracketed by another calibration and background measurement at the end of January 2017. After that, we will make use of the calibrated radon-222 series, and CO₂ data collected by ICOS partners, to derive a CO₂ “near baseline” for the full year 2016. Analysis of data from 2010 has shown a 45% larger amplitude and 30° phase shift compared with Mauna Loa (Chambers et al., 2016). For the ICOS-CH Annual Meeting on 01.09.2016 at EMPA, Dübendorf, we had already performed a preliminary analysis for the period from November 2015 to June 2016. It suggested the same phase shift of 30° but a smaller, if at all, difference in amplitude. We plan to apply the unambiguous distinction between local and remote terrestrial influences described in Chambers et al. (2016) to estimate monthly local (central European) CO₂ source/sink strength based on a radon-222 mass balance approach. For the coming years, in collaboration with ICOS partners measuring CO₂ on Jungfrauoch, we expect to provide in this way a substantial and unique contribution to the observation of carbon fluxes in Europe.

Key words:

Baseline conditions, planetary boundary layer, free troposphere, radon-222, tracer

Internet data bases:

<http://radon.unibas.ch/>

<http://www.ansto.gov.au/ResearchHub/IER/Research/IsotopesinClimate/AtmosphericMixing/index.htm>

<http://www.gl.ethz.ch/research/bage/icos-ch/jungfrauoch.html>

Collaborating partners/networks:

Australian Nuclear Science and Technology Organisation (ANSTO), Sydney Australia

Laboratory of Atmospheric Chemistry, Paul Scherrer Institute, Villigen, Switzerland

Laboratory for Air Pollution/Environmental Technology, Swiss Laboratories for Material

Science and Technology (Empa), Dübendorf, Switzerland

Scientific publications and public outreach 2016:

Refereed journal articles and their internet access

Chambers, S.D., A.G. Williams, F. Conen, A.D. Griffith, S. Reimann, M. Steinbacher, P.B. Krummel, L.P. Steele, M.V. van der Schoot, I.E. Galbally, S.B. Molloy, and J.E. Barnes, Towards a universal “baseline” characterisation of air masses for high- and low-altitude observing stations using radon-222, *Aerosol and Air Quality Research*, **16**, 3, 885-899, doi: 10.4209/aaqr.2015.06.0391, 2016.
http://aaqr.org/VOL16_No3_March2016/33_AAQR-15-06-SIMtS-0391_885-899.pdf

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