

Name of research institute or organization:

Institut für Umweltphysik, Universität Heidelberg

Title of project:

Long-term observations of $^{14}\text{CO}_2$ at Jungfraujoch

Project leader and team:

Ingeborg Levin, project leader

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Project description:

Atmospheric $^{14}\text{CO}_2$ observations at Jungfraujoch are used as background for other observational sites in Central Europe to estimate the regional fossil fuel CO_2 component. The measurements were started in 1986 and have been continued without interruption until today. This globally unique data set has also been used in various other applications for dating of young artefacts and recent organic material.

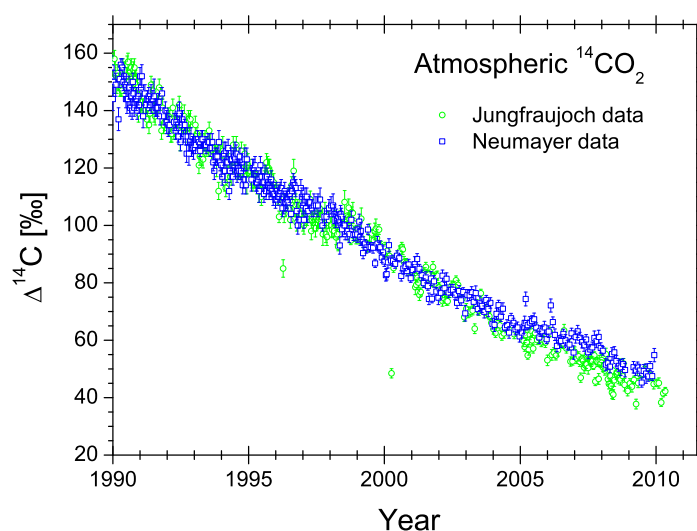


Figure 1: Comparison of long-term atmospheric $^{14}\text{CO}_2$ measurements at Jungfraujoch with those at the German Antarctic Neumayer station.

Compared to regular $^{14}\text{CO}_2$ observations performed by UHEI at the German Neumayer Station in Antarctica, only small annual average differences of less than 3‰ have been observed from 1990 until about 2005 (see also Levin et al., 2010). In recent years, however, a persistent $\Delta^{14}\text{C}$ depletion of more than 5‰ is observed at the northern hemispheric site Jungfraujoch compared to Neumayer (Figure 1). This is most probably due to the large increase of fossil fuel CO_2 emissions by developing countries in the last five years.

Key words:

carbon dioxide, carbon cycle modelling, Radiocarbon, fossil fuel CO₂, climate, Kyoto Protocol

Internet data bases:

<http://www.iup.uni-heidelberg.de/institut/forschung/groups/kk/>

[http://www.iup.uni-](http://www.iup.uni-heidelberg.de/institut/forschung/groups/fa/radiokohlenstoff/radiometrie-web-html)

[heidelberg.de/institut/forschung/groups/fa/radiokohlenstoff/radiometrie-web-html](http://www.iup.uni-heidelberg.de/institut/forschung/groups/fa/radiokohlenstoff/radiometrie-web-html)

Collaborating partners/networks:

ICOS (<http://www.icos-infrastructure.eu>)

Scientific publications and public outreach 2010:

Refereed journal article:

Levin, I., Naegler, T., Kromer, B., Cuevas, E., Diehl, M., Francey, R., Gomez-Pelaez, A.J., Schäfer, A., Steele, L.P., Wagenbach, D., Weller, R., and Worthy, D.E., Observations and modelling of the global distribution and long-term trend of atmospheric ¹⁴CO₂. *Tellus* **62B**, 26-46, 2010, doi: 10.1111/j.1600-0889.2009.00446.x.

Levin, I., S. Hammer, E. Eichelmann, F. Vogel, Verification of greenhouse gas emission reductions: The prospect of atmospheric monitoring in polluted areas. Accepted for publication, *Philosophical Transactions A*, 2011.

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