

Name of research institute or organization:

**Institut für Umweltphysik, Universität Heidelberg**

Title of project:

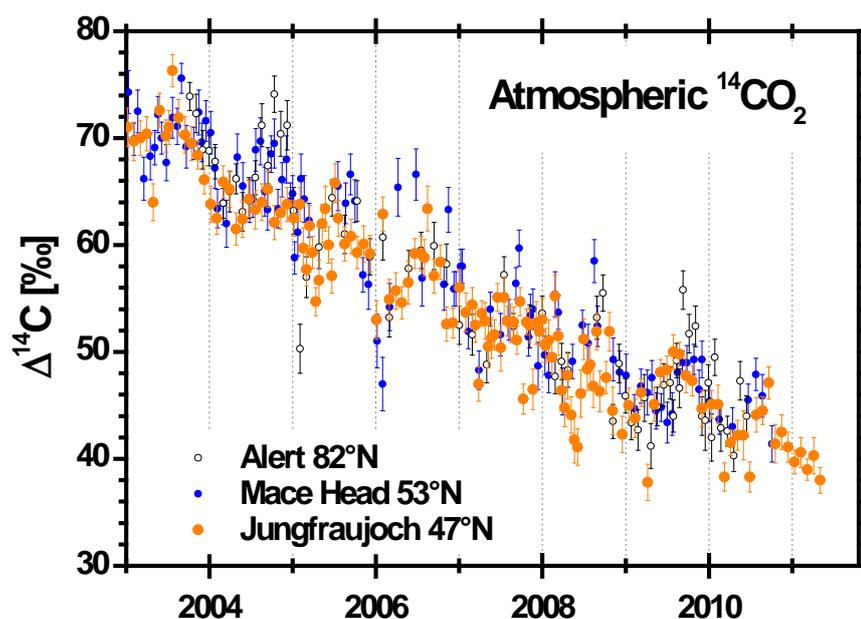
Long-term observations of  $^{14}\text{CO}_2$  at Jungfraujoch

Project leader and team:

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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  $\text{CO}_2$  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 and to estimate carbon turnover times e.g. in soils.



**Figure 1.** Comparison of  $^{14}\text{CO}_2$  measurements at Jungfraujoch with those at other background stations in the Northern Hemisphere, i.e. Mace Head located at the Irish west coast and Alert in the Canadian Arctic.

A question that is frequently discussed when selecting an appropriate background station for regional fossil fuel  $\text{CO}_2$  estimates at polluted stations in Europe is how well Jungfraujoch is suited as such a reference site. There may, indeed, be some

regional influence from fossil fuel CO<sub>2</sub> emissions also at high mountain sites, particularly in summer when these stations are not always decoupled from the boundary layer air. The comparison with our <sup>14</sup>CO<sub>2</sub> observations at Mace Head, Ireland, where sampling is restricted to the marine sector, as well as with measurements in the Canadian Arctic at Alert do, indeed, indicate that such a regional pollution influence at Jungfraujoch may be significant in late summer and autumn. But during winter and spring Jungfraujoch seems to be generally less influenced by fossil fuel CO<sub>2</sub> than the other two sites located at sea level.

Key words:

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carbon dioxide, carbon cycle modelling, Radiocarbon, fossil fuel CO<sub>2</sub>, climate, Kyoto Protocol

Internet data bases:

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<http://www.iup.uni-heidelberg.de/institut/forschung/groups/kk/>  
<http://www.iup.uni-heidelberg.de/institut/forschung/groups/fa/radiokohlenstoff/radiometrie-web-html>

Collaborating partners/networks:

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

Scientific publications and public outreach 2011:

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**Refereed journal article:**

Levin, I., S. Hammer, E. Eichelmann, F. Vogel, 2011. Verification of greenhouse gas emission reductions: The prospect of atmospheric monitoring in polluted areas. *Philosophical Transactions A* **369**, 1906-1924.

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