

Name of research institute or organization:

**Institut für Umweltphysik, Universität Heidelberg**

Title of project:

Long-term observations of  $^{14}\text{C}$  and  $^{222}\text{Rn}$  at Jungfraujoch

Project leader and team:

Ingeborg Levin, project leader  
Felix Vogel, Bernd Kromer, Dietmar Wagenbach

Project description:

Atmospheric  $^{14}\text{C}$  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 have been started in 1986 and were continued without interruption until today (Figure 1). In recent years, the Jungfraujoch  $^{14}\text{C}$  data was also often used, together with earlier observations at Vermunt at 1800m a.s.l. in the Austrian Alps, in various applications for dating of recent organic material.

Atmospheric  $^{222}\text{Rn}$  daughter observations started at Jungfraujoch in April 2006 in the frame of the EU-funded CarboEurope project. These observations can be used to identify (polluted) air masses that have recently been in contact with continental surfaces as well as for flux estimates of other continent-borne trace gases using the Radon-Tracer-Method. In summer 2008 difficulties have occurred with the  $^{222}\text{Rn}$  monitor so that measurements had to be stopped in autumn 2008, shortly before the end of the CarboEurope project.

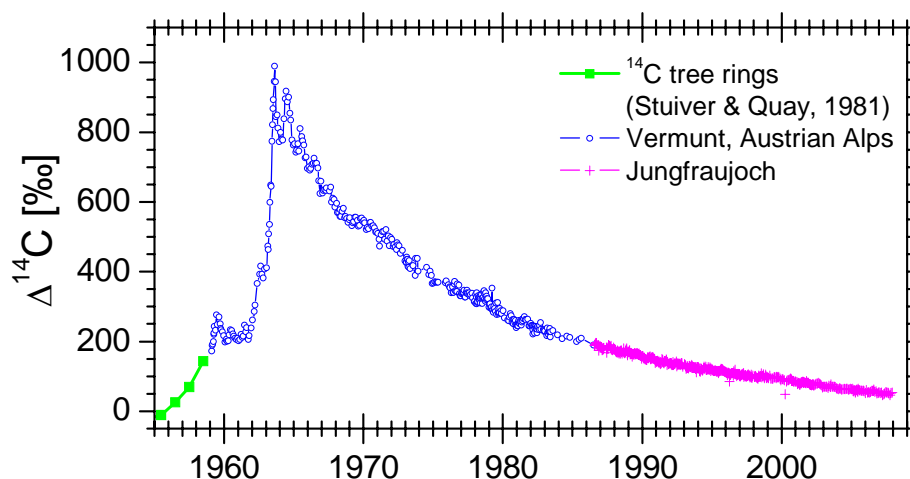


Figure 1: Long-term observations of  $^{14}\text{C}$  in atmospheric  $\text{CO}_2$  in the Alps supplemented by  $^{14}\text{C}$  measurements on tree rings (M. Stuiver and P. Quay, 1981, EPSL 53, 349–62). The strong increase of  $^{14}\text{C}$  in the early 1960s is due to the input of bomb- $^{14}\text{C}$ , the ongoing decrease due to the global release of  $^{14}\text{C}$ -free fossil fuel  $\text{CO}_2$  into the atmosphere.

Key words:

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carbon dioxide, radiocarbon, fossil fuel CO<sub>2</sub>, climate, Kyoto Protocol  
<sup>222</sup>Radon, atmospheric tracer

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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CarboEurope-IP (<http://www.carboeurope.org/>)  
ICOS (<http://www.icos-infrastructure.eu>)

Scientific publications and public outreach 2008:

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**Refereed journal article:**

Levin, I., S. Hammer, B. Kromer and F. Meinhardt, 2007. Radiocarbon observations in atmospheric CO<sub>2</sub>: Determining fossil fuel CO<sub>2</sub> over Europe using Jungfraujoch observations as background. *Sci. Total. Environ.*, doi. 10.1016/j.scitotenv.2007.10.019.

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