

Name of research institute or organization:

Institut für Umweltp Physik, Universität Heidelberg

Title of project:

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

Part of this programme:

ICOS

Project leader and team:

Dr. Ingeborg Levin, project leader

Dr. Samuel Hammer

Project description:

Atmospheric $^{14}\text{CO}_2$ observations at Jungfraujoch started in 1986 and were continued without interruption until today. This long-term record is used for studies of the dynamics of the regional and global carbon cycle. Currently, it is mainly used as background reference to estimate the regional fossil fuel CO_2 component at polluted European stations. In the last decade, the observed $\Delta^{14}\text{CO}_2$ trend is mainly due to dilution of the $^{14}\text{C}/\text{C}$ ratio in atmospheric CO_2 by ongoing input of ^{14}C -free fossil fuel CO_2 into the global atmosphere. This trend of about -4‰ per year up to 2010 has steepened significantly in the last years to about -5‰ per year (Figure 1). The reason for this steepening may be changes of the natural $^{14}\text{CO}_2$ fluxes to and from the atmosphere, but is most probably caused by an accelerating increase of ^{14}C -free fossil fuel CO_2 release into the global atmosphere. Long-term monitoring of atmospheric $^{14}\text{CO}_2$ may thus provide independent constraints on the global release rate of fossil fuel CO_2 . Currently, this application bears, however, still considerable uncertainty due to not well defined $^{14}\text{CO}_2$ disequilibrium fluxes from the global terrestrial biosphere and the oceans.

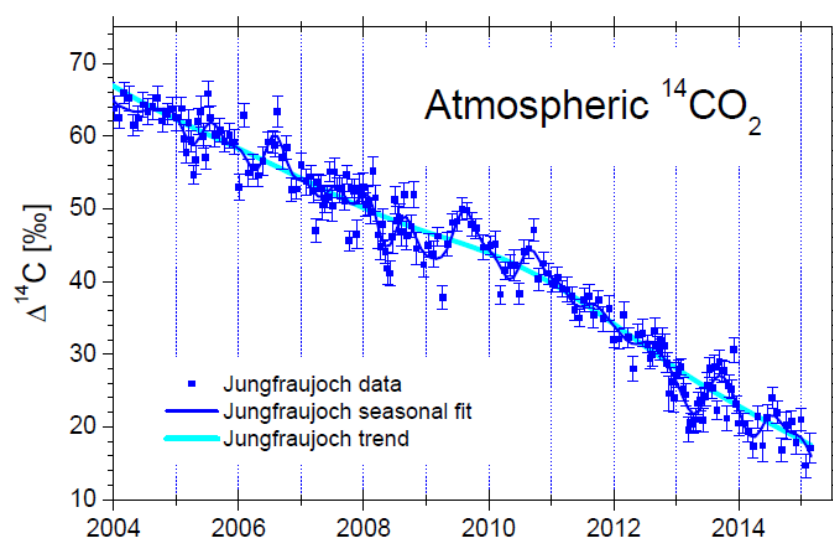


Figure 1: $\Delta^{14}\text{CO}_2$ measurements at Jungfraujoch together with a harmonic fit curve through the data, showing $\Delta^{14}\text{CO}_2$ maxima in late summer and minima in late winter. The long term trend has changed around 2010 from about -4‰ to about -5‰ per year.

Key words:

Carbon dioxide, carbon cycle modelling, radiocarbon, fossil fuel CO₂

Internet data bases:

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

Data have regularly been published in peer-reviewed journals, yet unpublished data are available on request at the authors

Collaborating partners/networks:

ICOS (<https://www.icos-ri.eu/>)

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