

Name of research institute or organization:

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**Climate and Environmental Physics, University of Bern  
Bundesamt für Strahlenschutz, Freiburg i.Br.**

Title of project:

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<sup>85</sup>Kr Activity Determination in Tropospheric Air

Project leader and team

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Project description:

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Since more than 15 years the tropospheric Kr-85 activity has been continuously monitored at Jungfraujoch (JFJ). In the last year this valuable data record has been expanded. Krypton separated from about 10 m<sup>3</sup> of air, which are collected during one week, is sent to Freiburg i.Br for activity measurement (Figure 1).

At present the baseline of the Kr-85 activity concentration is app. 1.45 mBq/m<sup>3</sup> at the stations located in the northern hemisphere. The Kr-85 activity concentration in ground level air showed a regular increase of about 0.03 Bq/m<sup>3</sup> per year during the last decades. This corresponds to a yearly global release rate of about 5·10<sup>17</sup> Bq. It can be assumed that this trend will be continued due to a planned increase of reprocessing activities in the coming years e.g. in Japan. The ground level reached in the year 2006 at JFJ is slightly lower than the baseline of 1.45 mBq/m<sup>3</sup> (Figure 1). The release from the reprocessing facilities occurs pulsed. This spikes from La Hague or Sellafield are higher and more frequent at Freiburg i. Br. than at JFJ (Figure 1). This is due to the larger distance of the JFJ station from the main source La Hague and the elevated altitude of 3454 m asl of the station compared to Freiburg with 276 m asl.

The data of the global Kr-85 measuring network provides an instrument for the surveillance of radioactivity in the environment. The location of the JFJ sampling site is strategically important because at this altitude the northern tropospheric background level can best be determined. Secondly, the gradient of the baseline concentration and the occurrence of elevated peak concentrations allow some conclusion about the global and local reprocessing activities, respectively. This feature of Kr-85 could be an important tool to monitor clandestine nuclear reprocessing activities.

Known Kr-85 emissions can also be used for the validation and calibration of global circulations models. The well known atmospheric Kr-85 activity provides last but not least the basis for one of the most reliable dating methods for groundwater.

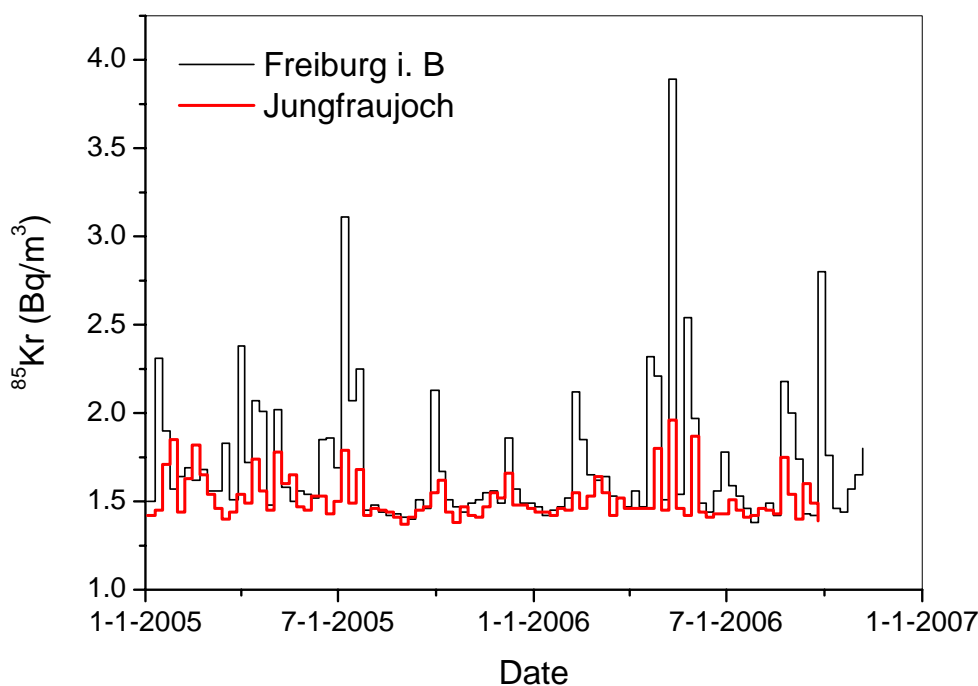


Figure 1: measured  $^{85}\text{Kr}$  activities in weekly samples of air, collected at Jungfrauoch (3500 m a s l) and at Freiburg i. B. (276 m a s l) in the last two years.

Key words:

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Krypton,  $^{85}\text{Kr}$ , radioactivity in air, reprocessing plants

Internet data bases:

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Collaborating partners/networks:

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Scientific publications and public outreach 2004:

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Umweltradioaktivität und Strahlendosen in der Schweiz, Bundesamt für Gesundheit, Abteilung Strahlenschutz, 2004, 2005, 2006 (in preparation)

Winger K., Feichter M. B., Kalinowski M., Sartorius H., and Schlosser P. (2005) A new compilation of the atmospheric  $^{85}\text{Kr}$  inventories from 1945 to 2000 and its evaluation in a global transport model. *Journal of Environmental Radioactivity* **80**, 183-215.

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