

Name of research institute or organization:

Climate and Environmental Physics, University of Bern

Title of project:

⁸⁵Kr activity determination in tropospheric air

Project leader and team:

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Freiburg i.Br., Germany
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Project description:

The collection of air samples for ⁸⁵Kr activity measurements has been continued in 2002. A few cc of Krypton are collected in weekly samples from about 10 m³ of air at Jungfraujoch. These samples are sent to Freiburg i.Br. for Krypton purification and activity measurement.

This isotope is unique because it contributes the major part of the present-day artificial activity in air, and because up to now it is one of the rare isotopes which shows an increase in its atmospheric activity. Jungfraujoch is preferred as sampling site because there the equilibrium tropospheric activity can best be determined, since

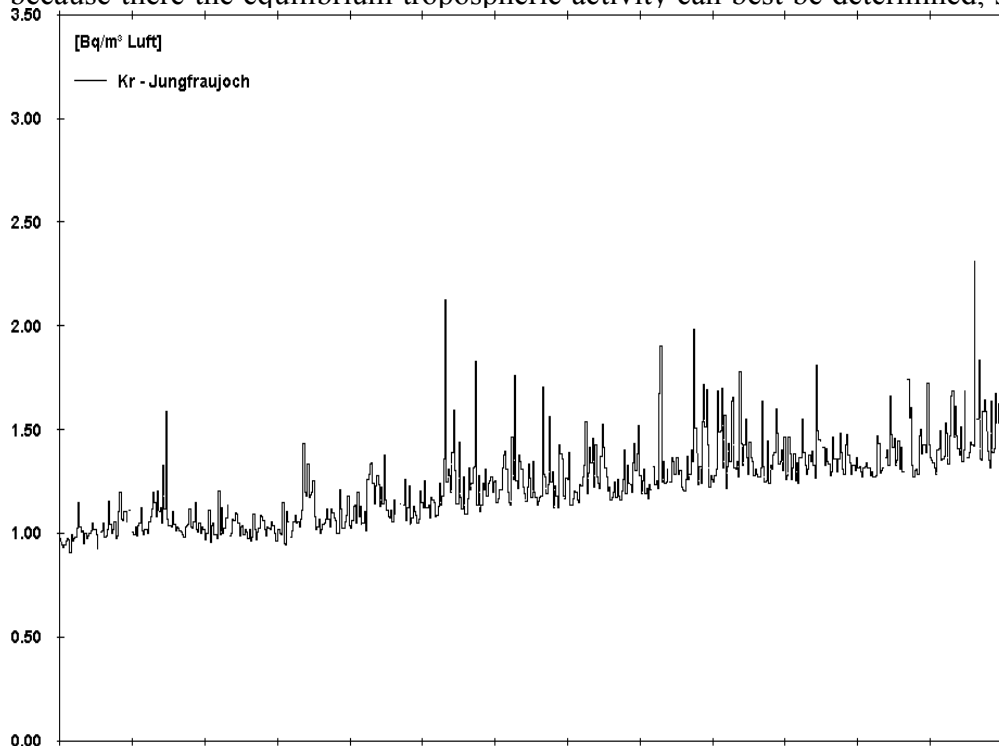


Figure 1: Time series of weekly ⁸⁵Kr activity in air (1990-2002).

Figure 1 shows the increasing trend: the ground level increased from about 1 Bq/m³ in 1990 to about 1.4 Bq/m³ in 2002. To compensate for the yearly loss of activity in the atmosphere by radioactive decay and to account for the linear increase of the atmospheric inventory, a yearly emission rate of $5 \cdot 10^{17}$ Bq can be estimated.

Superimposed are irregular spikes of higher activity, when air masses from a reprocessing plant reaches Jungfrauoch without enough dilution with uncontaminated air. These spikes are visible in Figure 1 and also in more detail for the last two years in Figure 2. In Figure 2 activity values are compared from three sampling sites with different altitudes above sea level. From the measurements it is obvious that increased levels are lower at Jungfrauoch (3500m) than at Schauinsland (1000m) and Freiburg i.Br. (200m) and that at Jungfrauoch the frequency of increased levels is lower.

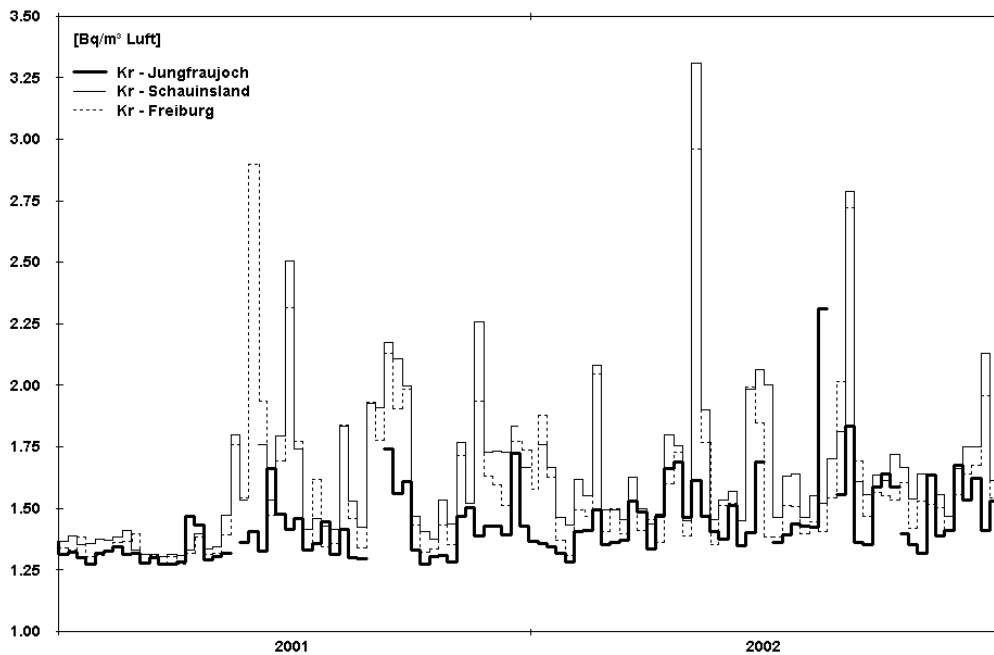


Figure 2: Comparison of ^{85}Kr activities in Krypton extracted at three different altitudes above sea level.

In the week from August 12 to 19, 2002, also at Jungfrauoch a relatively high activity of $2,3 \text{ Bq/m}^3 \pm 0,2 \%$ has been measured. To determine the origin of this activity, backward trajectories have been used twice per day. They clearly show that in this week some sea level air from Great Britain reached Jungfrauoch, indicating Sellafield as origin of the excess ^{85}Kr activity.

Key words:

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

Internet data bases:

Collaborating partners/networks:

Scientific publications and public outreach 2002:

Sartorius, H., W. Weiss, and H.H. Loosli: 10 years of ^{85}Kr Results on Samples from Jungfrauoch, and still it is very interesting, Workshop on 'Atmospheric Research at the Jungfrauoch and in the Alps', Davos, 20 September 2002, Swiss Academy of Sciences SAS, 56-57, 2002

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