

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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Project description:

The collection of air samples for ⁸⁵Kr activity measurements has been continued at Jungfraujoch in 2004. A few cc of Krypton are collected in weekly samples from about 10 m³ of air. These samples are sent to Freiburg i.Br. for Krypton separation, purification and for activity measurement.

This isotope is unique because it contributes the major part to the present-day artificial activity in air, and because up to now it is one of the rare radioisotopes which show an increasing trend in the global atmosphere. The radiation dose however is negligible compared to the dose components from internal and external radiation, including from cosmic rays.

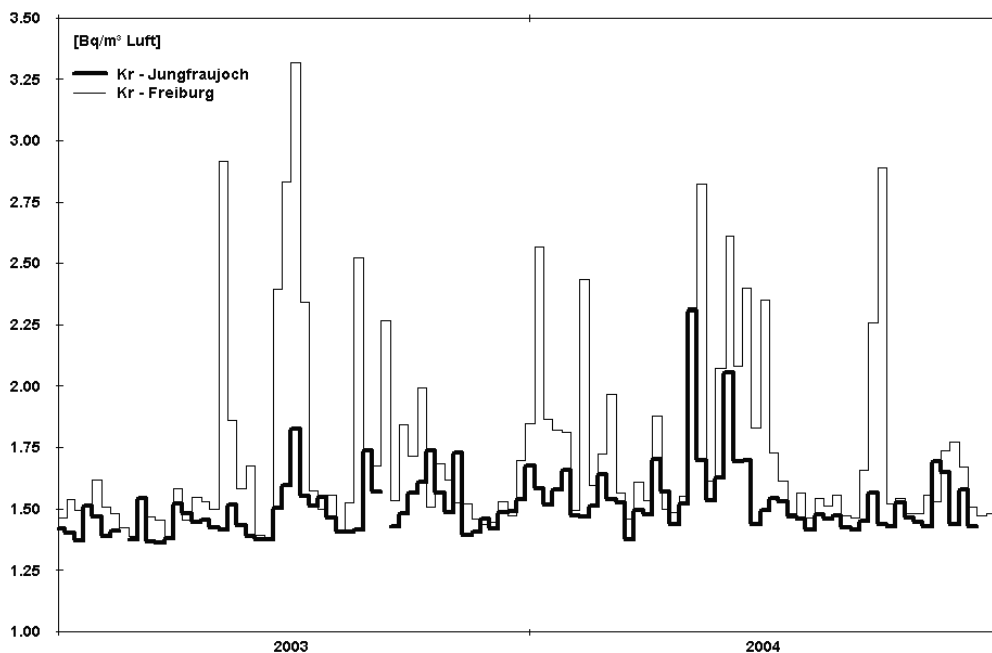


Figure 1: measured ⁸⁵Kr activities in weekly samples of air, collected at Jungfraujoch (3500 m a s l) and in Freiburg (200m) in the last two years.

Jungfrauoch is preferred as sampling site because there the equilibrium ^{85}Kr activity in the northern troposphere can best be determined; at this altitude admixtures of contaminated air are less probable. This equilibrium tropospheric level corresponds in Figure 1 to the lowest measured values of about 1.4 Bq/m^3 . As published in earlier Jungfrauoch activity reports, the basic level shows an increasing trend in the last decades. This can also be concluded from Figure 1. To compensate for the yearly loss of activity in the atmosphere by radioactive decay and to account for the linear increase of the global atmospheric inventory, a total yearly emission rate of $5 \cdot 10^{17} \text{ Bq}$ from reprocessing plants can be estimated.

Superimposed to the basic level are irregular spikes of higher activity. This happens when air masses from reprocessing plants reach the sampling site without enough dilution with uncontaminated air. Increased activity values up to 2.9 Bq/m^3 are measured in 2004 in samples collected at the low altitude station Freiburg i.Br., whereas at Jungfrauoch the highest value reaches “only” 2.3 Bq/m^3 (in May 2004). Several increased values at Jungfrauoch correlate with high values in Freiburg; probably the origin of the excess ^{85}Kr is the same for both sampling sites. Forward and backward wind trajectories help to define the origin of the increased ^{85}Kr activities; usually La Hague (France) and Sellafield UK) can be distinguished.

Key words:

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

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Scientific publications and public outreach 2004:

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

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