Name of research institute or organization:

Institut für Umweltgeowissenschaften, Universität Basel

Title of project:

Quantifying mountain venting of boundary layer air through ^{222}Rn measurements

Project leader and team:

Dr. Franz Conen, project leader
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Project description:

Mountain venting is an interesting phenomenon by which boundary layer air can rise to high altitudes that are otherwise influenced by free tropospheric air, such as the High Altitude Research Station Jungfraujoch. This phenomenon makes for interesting research on land-atmosphere interactions, like trace gas exchange or air pollution, as long as a reliable distinction between boundary layer and free tropospheric air can be made. With this project, we try to provide such a tool to the community working on Jungfraujoch, while also hoping to learn more about mountain venting in general. The ^{222}Rn detector on Jungfraujoch was operating throughout the year 2010. In July, we replaced its detector head, thereby lowering the instrumental background by about a factor of 5 and increasing sensitivity by around 25 %.

Figure 1: Working on the ^{222}Rn detector in the caverne next to the research station (picture by Lukas Zimmermann)

In 2010, we also operated in parallel a second detector on the roof of the Physics Institute in Bern. Data from both detectors is freely available on

http://radon.unibas.ch. The data from both instruments is processed automatically and has not yet been checked for its quality. By the end of 2010, construction work may have caused venting of air from the tunnel system, which is rich in ^{222}Rn, towards our detector inlet. Another issue we are addressing in a quality check, is data collected during periods when the air inlet may have been under snow. We still work on identifying potentially affected data. A first glance at the (still preliminary) data sets indicates that the lower bound of ^{222}Rn activity at Jungfraujoch tends to be higher during the middle of the year than at other times, while at Bern it is the other way round (Figure 2). During winter time (days 0-45 and days 270-350), there were prolonged periods with several Bq m^{-3} difference between both stations, while during the middle of the year, activity concentrations were sometimes very close, especially during the afternoons of fair weather days (Figure 3).

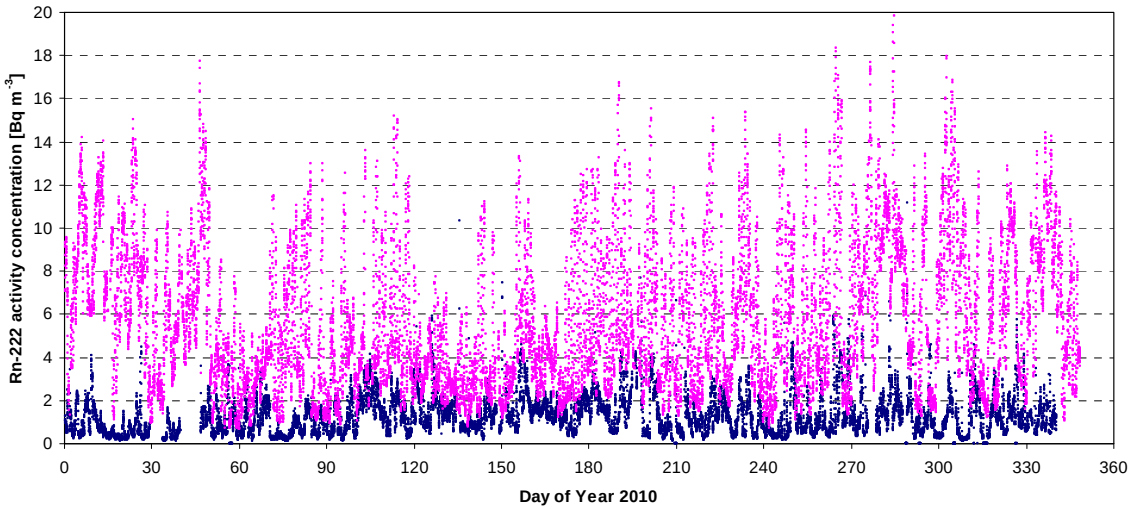

Figure 2: First overview of ^{222}Rn activity data collected at Jungfraujoch (blue) and Bern (pink) during the year 2010. The data is not yet fully quality-controlled. We are working on that.

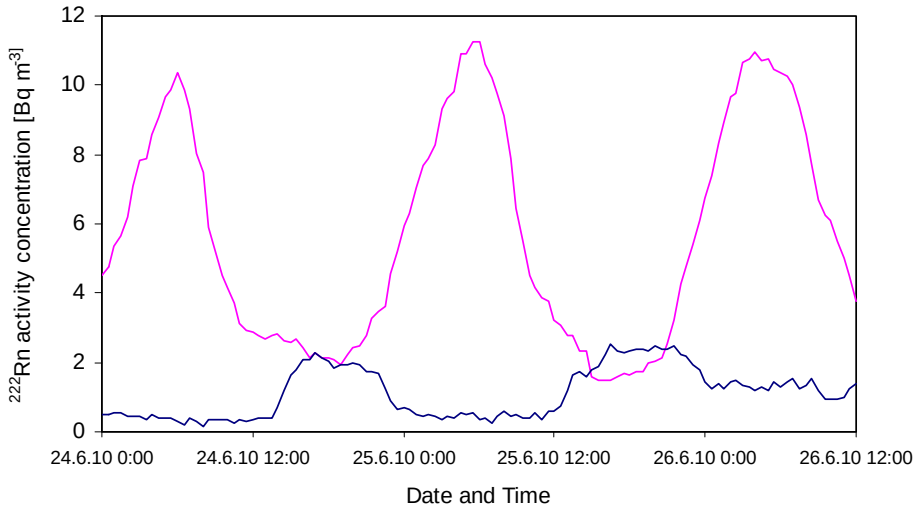

Figure 3: Example of ^{222}Rn activity concentrations at Jungfraujoch (blue) and Bern (pink). Note: In this chart, Jungfraujoch ^{222}Rn activity data has been normalised to atmospheric pressure in Bern.

Key words:

Atmospheric transport, boundary layer, free troposphere, ^{222}Rn

Internet data bases:

http://radon.unibas.ch
http://pages.unibas.ch/environment

Collaborating partners/networks:

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