Geophysical Research Abstracts
Vol. 17, EGU2015-2098, 2015
EGU General Assembly 2015

Using radon-222 to distinguish between vertical transport processes at Jungfraujoch

Alan Griffiths (1), Scott Chambers (1), Franz Conen (2), Ernest Weingartner (3), Lukas Zimmermann (2), Alastair Williams (1), and Martin Steinbacher (4)

(1) Australian Nuclear Science and Technology Organisation, New South Wales, Australia (alan.griffiths@ansto.gov.au, scott.chambers@ansto.gov.au, alastair.williams@ansto.gov.au), (2) Environmental Geosciences, Department of Geosciences, University of Basel, Switzerland (franz.conen@unibas.ch, lukas.zimmermann@unibas.ch), (3) Institute for Aerosol and Sensor Technology, University of Applied Sciences, 5210 Windisch, Switzerland (ernest.weingartner@fhnw.ch), (4) Swiss Federal Laboratories for Materials Science and Technology (Empa), Dübendorf, Switzerland (Martin.Steinbacher@empa.ch)

Trace gases measured at Jungfrajoch, a key baseline monitoring station in the Swiss Alps, are tranported from the surface to the alpine ridge by several different processes. On clear days with weak synoptic forcing, thermally-driven upslope mountain winds (anabatic winds) are prevalent.

Using hourly radon–222 observations, which are often used to identify air of terrestrial origin, we used the shape of the diurnal cycle to sort days according to the strength of anabatic winds. Radon is ideal as an airmass tracer because it is emitted from soil at a relatively constant rate, it is chemically inert, and decays with a half-life of 3.8 days. Because of its short half-life, radon concentrations are much lower in the free troposphere than in boundary-layer air over land.

For comparable radon concentrations, anabatic wind days at Jungfraujoch are different from non-anabatic days in terms of the average wind speed, humidity, air temperature anomalies, and trace species. As a consequence, future studies could be devised which focus on a subset of days, e.g. by excluding anabatic days, with the intention of choosing a set of days which can be more accurately simulated by a transport model.