Name of research institute or organization:

Climate and Environmental Physics, Universität Bern

Title of project:

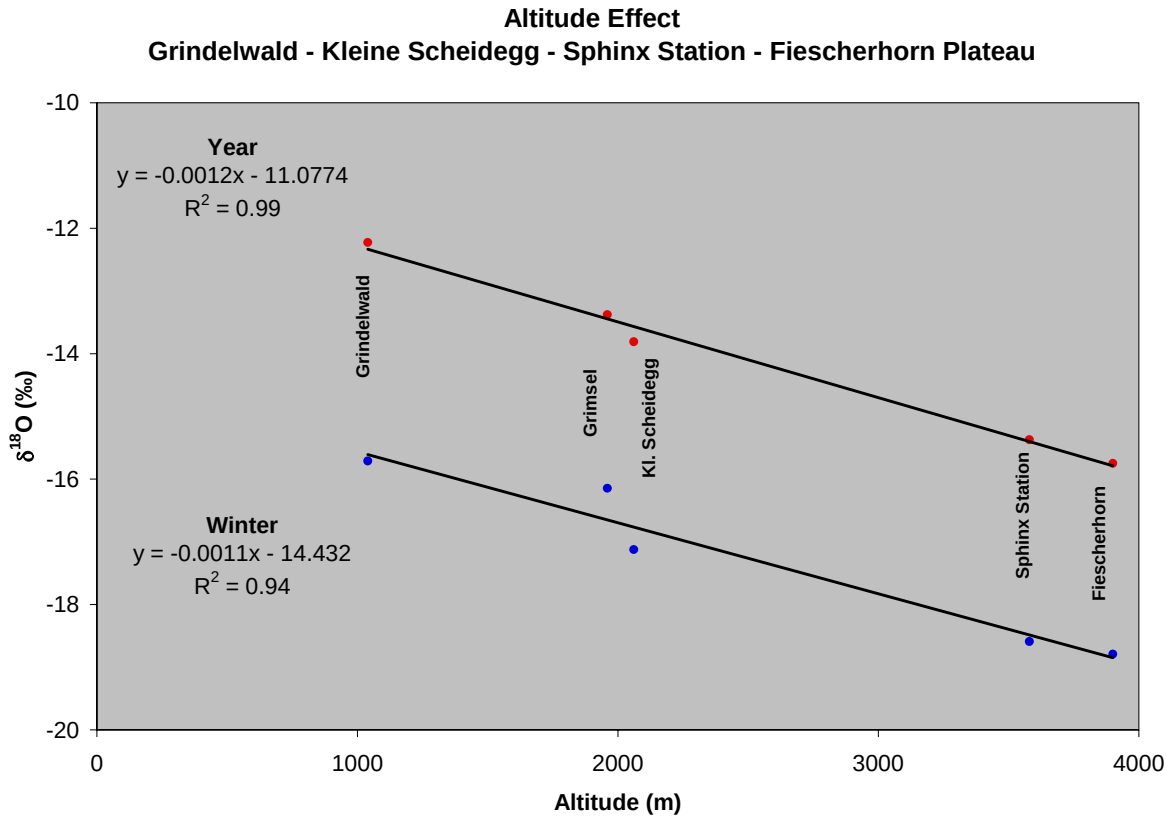
Comparison of stable isotopes (^{2}H and ^{18}O) in precipitation taken at the Sphinx station, Kleine Scheidegg, Grindelwald and Grimsel.

Project leader and team

Ulrich Schotterer, Hansueli Bürki, Markus Leuenberger, Peter Nyfeler, Willibald Stichler

Project description:

When air masses are orographically uplifted, they cool and precipitate preferentially the heavier isotopes. Depending on the precipitation history, the degree of cooling and the precipitable moisture left, the altitude effect on oxygen-18 in mid latitudes generally ranges between 0.15 and 0.30‰ for each 100 m of altitude gained. The Jungfrau region offers an excellent opportunity to study this effect for an altitude difference of nearly 3000 meter. The Division of Climate and Environmental Physics runs a stable isotope network for more than 20 years at Grindelwald, Kleine Scheidegg and the Sphinx station to apply the variability of stable isotopes with altitude to ice core studies as performed for instance at the Jungfraujoch Firn or the Fiescherhorn Plateau. In contrast to direct precipitation measurements glaciers are open systems for precipitation accumulated at their surface and the amount left by wind scour, sublimation, and melt (net accumulation) may vary considerably from year to year. In case of snow precipitation sampling with standard devices is also problematic due to excessive snow drifting. For this reason no data on the amount of precipitation are published at the Sphinx station officially. However, the total monthly net weight of samples collected after a precipitation event may be a fairly good indication of the seasonal precipitation distribution under field conditions. The data sets afford a unique possibility to assess quantitatively both, the influence of sampling snow and the influence of post-depositional effects on the δ-values under present-day conditions. In the figure below the long-term $\delta^{18}O$ mean (1983 – 2000) from Grindelwald, Kleine Scheidegg, Sphinx station, and Fiescherhorn Plateau are plotted against altitude. The altitude effect is rather low as compared to the published data but the slopes for the whole year and winter (November to March) are more or less the same. The ice core data from Fiescherhorn fit well, although seasonal or yearly dating does very seldom coincide with the calendar based time axis.



Key words

Isotopes, precipitation, ice core studies

Collaborating partners/networks:

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