Reconstruction of Holocene warm periods by cosmogenic nuclide burial dating using ^{10}Be and ^{14}C

J.M. Schaefer (L-DEO), C. Schluechter (Univ. of Berne, Switzerland), Nat Lifton (University of Arizona, Tucson)

Abstract

Reconstruction of past glacial advances has proven to be an important approach for better understanding the nature and magnitude of past climate excursions. However, most current reconstructions are limited to the maximum of a glacial event, i.e. the peak of cold periods.

We are proposing to reconstruct periods of smaller mountain glaciers than today during the Holocene. We apply the method of burial dating by in-situ ^{10}Be and ^{14}C. The difference between the respective cosmogenic nuclide concentrations in previously exposed surfaces now covered (or until very recently covered) by the glacier, allows to evaluate the exposure history in the past. ^{14}C and ^{10}Be are particularly promising tools for this burial dating method, since the half-lifes are very different and both are produced in and extracted from quartz. The application is however limited to the Holocene since the ^{14}C concentrations approach secular equilibrium after exposure of more than 10 kyr.

The pilot sample site proposed here is the bedrock very recently (re-)exposed by the Rhone Glacier, Switzerland (Fig. 1). If successful, this method will allow entirely new perspectives on evaluations of glacial lowstand periods, i.e. climate periods warmer than today.