Thermal State of Frozen Ground in a Changing Climate During the IPY

Abstracts from the Third European Conference on Permafrost 13-17 June 2010

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Published by The University Centre in Svalbard
ISBN: 978-82-481-0010-2

Cover page picture:
Reindalen Pingos
Svalbard, Norway, April 20, 2010
Jordan R. Mertes

Relative-Age Dating of Rock Glacier Surfaces with Schmidt Hammer in Blenio Valley, Southern Swiss Alps

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1 INTRODUCTION AND STUDY AREA

Within the framework of scientific researches related to geomorphological and climatic evolution of the Alps during Lateglacial and Holocene, only few studies were carried out on periglacial sedimentary terrains. In order to reconstitute the palaeoenvironmental history of the alpine periglacial domain, this research had focused on the morphostratigraphy of relict, inactive and active rockglaciers. This relative surface dating was performed with the analysis of Schmidt hammer rebound values (*R*-values) (for the method, see Kellerer-Pirklbauer, 2008).
The studied area is the Cima di Gana Bianca massif, in the Eastern part of the Blenio Valley (Lepontine Alps of the Tessin, Southern Switzerland). The rockglaciers of this area have been described by Scapozza and Fontana (2009), who proposed a relative-age dating of the relict rockglaciers based on the correlation with Lateglacial glacier fluctuations. Schmidt hammer rebound values have been measured on six rockglaciers, on a talus slope and on glacial landforms (moraines, *roches moutonnées*, etc.). We present here the results obtained on the Stabbio di Largario and the Pièi active rockglaciers.

2 RESULTS AND DISCUSSION

The Schmidt hammer results of the two studied rockglaciers are summarised in Fig. 1. The 95% confidence limits are generally below ± 1.00, except for the sites 10 and 11.
The Stabbio di Largario rockglacier is a large monomorphic rockglacier. Mean *R*-values range from 48 on a rock surface adjacent to the rockglacier (site 10 on Fig. 1) to 60 in the rooting zone of the rockglacier (site 1), occupied in the Little Ice Age (LIA) by a small glacier. A constant decrease in *R*-values is observed between the rooting zone and the front of the rockglacier (site 4), indicating an increasing in surface age from the top towards the front of the rockglacier.
The Pièi rockglacier is a large polymorphic rockglacier, composed by two superposed lobes. Mean *R*-values range from 44 on the *roches moutonnées* attributed by Scapozza and Fontana (2009) to the end of the Oldest Dryas (site 11) to 57 on the upper lobe of the rockglacier (sites 5 and 6). The *R*-values of 55 measured on the lower lobe of the rockglacier are significantly lower that the ones measured on the upper lobe.
A tentative of calibration of the ages based on the *R*-values measured on three surfaces of known age (cf. Kellerer-Pirklbauer, 2008) is presented in Fig. 1. In a chronological point of view, the result shows that the minimum surface age of the investigated rockglaciers lies between 3 and 5 cal ka BP and that it is likely that these rockglaciers started to evolve during the early phases of the Holocene or, at the latest, after the early-to-mid Holocene temperature optimum (ending around 5 cal ka BP).

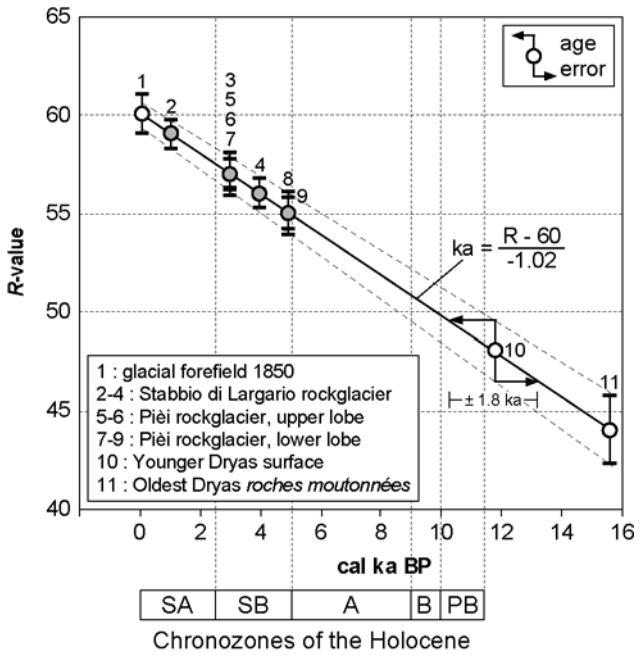

Figure 1. Tentative age-calibration curves based on three surfaces of known age (open circles) for the *R*-values measured on the Stabbio di Largario and Pièi rockglaciers. The calculation of age error is illustrated for the Younger Dryas surface. Grey circles indicate calculated ages based on this approach. Holocene chronozones: SA = Subatlantic; SB = Subboreal; A = Atlantic; B = Boreal; PB = Preboreal.

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