



Alpine glacier history during isotope stage 5 from speleothems: a case study from a flowstone near Innsbruck, Austria

C. Spötl (1) and A. Mangini (2)

(1) Institut für Geologie und Paläontologie, Leopold-Franzens-Universität Innsbruck, Innrain 52, 6020 Innsbruck, Austria (christoph.spoetl@uibk.ac.at)

(2) Forschungsstelle Radiometrie, Heidelberger Akademie der Wissenschaften, Im Neuenheimer Feld 229, 69120 Heidelberg, Germany

Calcitic flowstones, up to 40 mm thick, are present in narrow subvertical fractures that dissect a Pleistocene breccia deposit in the central Inn valley near Innsbruck. Useries disequilibrium dating shows evidence for several episodes of carbonate deposition, ca 101 kyr, ca 82 kyr and ca 74 kyr. Although these growth phases cannot be differentiated petrographically, they are clearly separated by marked drops in the O isotope values by up to 4 per mil (down to -14.9 per mil VPDB). The stable C isotopic composition shows variations between -9.7 to 6.7 per mil that do not co vary with the O isotope values.

The occurrence of these speleothems and their low carbon isotopic composition record periods of carbonate precipitation in the unsaturated zone under the influence of soil-derived carbon dioxide and demonstrate that the central Inn valley – which harboured one of the most extensive valley glaciers during the glacial maxima – was ice-free during marine isotope stage 5c and 5a. The isotope record shows evidence of several significant and probably rapid cooling events in between which can be correlated to sea-surface temperatures in the Mediterranean as well as air temperatures in Greenland. These speleothems constrain the possible advance of eastalpine glaciers during the isotope stage 5/4 transition to after 74 kyr.