

Ivy-Ochs, S., H. Kerschner, P.W. Kubik, Ch. Schlüchter (2006): Glacier response in the European Alps to Heinrich event 1 cooling: the Gschnitz stadial. *Journal of Quaternary Science*, 21(2), 115-130. DOI: 10.1002/jqs.995, (online: 27 Oct 2005)

Abstract

The Gschnitz stadial was a period of regionally extensive glacier advance in the European Alps that lies temporally between the breakdown of the Last Glacial Maximum piedmont lobes and the beginning of the Bølling warm interval. Moraines of the Gschnitz stadial are found in medium to small catchments, are steep-walled and blocky, and reflect a snowline lowering of 650 - 700m in comparison to the Little Ice Age reference snowline. ^{10}Be surface exposure dating of boulders from the moraine at the type locality at Trins (Gschnitz valley, Tyrol, Austria) shows that it stabilised no later than 15400 ± 1400 yr ago. The overall morphological situation and the long reaction time of the glacier suggest that the climatic downturn lasted about 500 ± 300 yr, indicating that the Gschnitz cold period began approximately 15900 ± 1400 yr ago, if not somewhat earlier. This is consistent with published radiocarbon dates that imply that the stadial occurred sometime between 15 400 ^{14}C yr BP (18020 - 19100 cal. yr) and 13250 ^{14}C yr BP (15360 - 16015 cal. yr). A palaeoclimatic interpretation of the Gschnitz glacier based on a simple glacier flow model and statistical glacier-climate models shows that precipitation was about one-third of modern-day precipitation and summer temperatures were about 10 K lower than today. In comparison, during the Younger Dryas, precipitation in this area was only about 10% less and T_s (summer temperature) was only 3.5-4 K lower than modern values. Based on the age of the moraine and the cold and dry climate at that time, we suggest that the Gschnitz stadial was the response of Alpine glaciers to cooling of the North Atlantic Ocean associated with Heinrich Event 1. Copyright 2005 John Wiley & Sons, Ltd.