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TEPHROCHRONOLOGICAL DATING OF HOLOCENE MORAINES AT ICELANDIC GLACIERS, AND CLIMATIC INTERPRETATIONS.

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Abstract

Fluctuations of Icelandic glaciers reveal the impact of regional climate change on the cryosphere, filtered by the different response characteristics of individual glaciers. Frequent tephra deposition upon steadily aggrading aeolian soils provides a useful dating environment, in which basal tephras often provide close minimum ages on underlying tills and outwash deposits in areas where the local tephrostratigraphy is well constrained. We have dated moraines at glaciers across Iceland to improve the Holocene glacial chronology in terms of its temporal extent and resolution. Tephrochronology also provides a test of lichenometric dating, an area for further research. At least five groups of regionally-synchronous advances occurred between c. AD 1700 and 1930 during the “Little Ice Age”. The maximum extent of “Little Ice Age” glaciers varies by up to 200 years across Iceland, due more to the response chraracteristics of individual glaciers than to regional climatic variation. At Gígjökull, two glacier advances occurred before the 3rd century AD, with others in the 9th and 12th centuries AD bracketing the Medieval Warm Period. In central and northern Iceland, earlier glacier advances are dated to *c*. 4.5-5.0, *c*.3.0-3.5 ka BP, *c*. 2.0-2.5 ka BP. This classic “Neoglacial” sequence is comparable to other parts of Europe and Scandinavia, but is discernible only at smaller mountain glaciers. In contrast, the 19th-Century advance of large ice caps censored evidence of earlier fluctuations from the moraine record, and preservation potential is preconditioned by glacier type. In general, the forefields of steep, fast-responding glaciers contain more complete archives of Holocene climatic changes than do the margins of the large icefields. Glacier advances appear to be favoured by a weakening of zonal circulation (the negative mode of the North Atlantic Oscillation) associated with cooler, drier winters and cooler, wetter summers.

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