Geophysical Research Abstracts
Vol. 13, EGU2011-10853, 2011
EGU General Assembly 2011

Tephrochronology and the status of the Little Ice Age glacial maximum in Iceland.

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Moraine evidence is commonly used to infer the timing of cool climate episodes, often invoking simple assumptions about glacier reaction and response. Tephrochronological dating of Holocene moraines across Iceland raises questions about the representativeness, in space and time, of local glacier chronologies, and about the status of the Little Ice Age (LIA) "glacier maximum". We have identified at least five groups of regionally-synchronous LIA advances between c. AD 1700 and 1930. Earlier advances occurred before the 3rd century AD, with others in the 9th and 12th centuries AD bracketing the Medieval Warm Period. Mid-Holocene 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 in Iceland 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 appears to be preconditioned by glacier type. The concept of a time-specific LIA glacier maximum is qualified, because local maxima were asynchronous while the regional pattern of advances was synchronous.