Geophysical Research Abstracts,
Vol. 11, EGU2009-13905, 2009
EGU General Assembly 2009

Latest Pleistocene and Holocene alpine glacier fluctuations in Scandinavia

A Nesje (1,2)

(1) Department of Earth Science, University of Bergen, Allégaten 41, N-5007 Bergen, Norway, (2) Bjerknes Centre for Climate Research, Allégaten 55, N-5007 Bergen, Norway

During the early Holocene abrupt, decadal to centennial-scale climate variations caused significant glacier variations in Norway. Increased freshwater inflow to the North Atlantic and Arctic Oceans has been suggested as one of the most likely mechanisms to explain the abrupt and significant Lateglacial and early Holocene climatic events in NW Europe. The largest early Holocene glacier readvances occurred ~11,200, 10,500, 10,100, 9700, 9200 and 8400-8000 cal. yr BP. The studied Norwegian glaciers apparently melted away at least once during the early/mid-Holocene. The period with the most contracted glaciers in Scandinavia was between 6600 and 6000 cal. yr BP. Subsequent to ~6000 cal. yr BP the glaciers started to advance and the most extensive glaciers existed at about ~5600, 4400, 3300, 2300, 1600 cal. yr BP, and during the 'Little Ice Age'. Times with overall less glacier activity were apparently around 5000, 4000, 3000, 2000, and 1200 cal. yr BP. It has been proposed that several glacier advances occurred in Scandinavia (including northern Sweden) at ~8500-7900, 7400-7200, 6300-6100, 5900-5800, 5600-5300, 5100-4800, 4600-4200, 3400-3200, 3000-2800, 2700-2000, 1900-1600, 1200-1000, and 700-200 cal. yr BP. Glaciers in northern Sweden probably reached their greatest 'Little Ice Age' extent between the 17th and the beginning of the 18th centuries. Evidence for early Holocene glacier advances in northern Scandinavia, however, has been questioned by more recent, multi-disciplinary studies. The early to mid-Holocene glacier episodes in northern Sweden may therefore be questioned.
Most Norwegian glaciers attained their maximum 'Little Ice Age' extent during the mid-18th century. Cumulative glacier length variations in southern Norway, based on marginal moraines dated by lichenometry and historic evidence, show an overall retreat from the mid-18th century until the 1930s-40s. Subsequently, most Norwegian glaciers retreated significantly. Maritime outlet glaciers with short frontal time lags (<10-15 years) started to advance in the mid-1950s, whereas long outlet glaciers with longer frontal time lags (>15-20 years) continued their retreat to the 1970s and 1980s. However, maritime glaciers started to advance as a response to higher winter accumulation during the first part of the 1990s. After 2000 several of the observed glaciers have retreated remarkably fast (annual frontal retreat >100 m) mainly due to high summer temperatures. The general glacier retreat during the early Holocene and the Neoglacial advances after 6000 cal. yr BP are in line with orbital forcing, due to the decrease of Northern Hemisphere summer solar insolation and the increase in winter insolation. In addition, regional weather modes, such as the North Atlantic Oscillation (NAO) and the Arctic Oscillation (AO), play a significant role with respect to decadal and multi-decadal climate variability.