
Evidence of Holocene mountain glacier fluctuations at Clavering Island (Northeastern Greenland) from ^{10}Be cosmic-ray exposure dating of moraines.

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Résumé

Glacial fluctuations during the Holocene have been poorly investigated in Northeastern Greenland. This work aims to establish an absolute chronology using in situ-produced ^{10}Be cosmic-ray exposure dating from glacial moraines formed by three mountain glaciers located at Clavering Island. After their sample preparation at the CALM laboratory (Meudon, France), the in situ-produced ^{10}Be concentration measurements of the sampled boulders were performed at the French national AMS facility ASTER (CEREGE, Aix en Provence, France). The exposure duration of moraines boulders span from the end of the Late Glacial to the Holocene periods (~ 19 to ~ 0.2 ka, with most of the dataset within the Holocene). Two glaciers evidence a maximum early Holocene extent at 10.4 ± 0.5 ka and 10.7 ± 0.3 ka with minor advances during the late Holocene. The third glacier shows remnants of moraine in which two blocks are dated at 13.8 ± 0.5 ka and 10.0 ± 1 ka. Several advances were identified during the late Holocene at about 3 ka, during the Dark Ages Cold Period (DACP: ~ 400 to 765 AD) and during the Little Ice Age (LIA: ~ 1450 to 1850 AD), synchronous with glacier advances documented from nearby lake sediments. The early maximum Holocene extent is broadly synchronous with other mountains glaciers in North Greenland, and does not appear to reflect northern high latitude summer insolation, but instead mimics recent regional continental temperature reconstructions. This study suggests that episodes of glacier expansion and retreat on multi- centennial timescales may be caused by enhanced fresh and cold waters from the East Greenland Current.

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