Glacial dynamics linked to climate change in Kangerlussuaq, Western Greenland.

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Abstract
Paleoclimatic trends in the polar region have become increasingly important following the recognition of a probable polar amplification to global warming (Huybrechts *et al.*, 2004). High latitude feedback mechanisms play an important role in the climate system, but in the absence of long term meteorological records, natural climate variability and feedback mechanisms remain poorly understood. Arctic areas are rich in glacial features of all sizes and their deposition time and mode contain one of the few continuous archives for deciphering past climate variability in present-day arid continental subarctic areas. Ice margins are highly sensitive to climate change and Surface Exposure Dating (SED) offers a direct insight into the final time when ice was present above glaciated features (Rinterknecht *et al.*, 2005). This proposal asks for support for a start-up project that aims to link the glacial dynamics of the Isunguata Sermia Glacier to climate change during the Holocene. Isunguata Sermia Glacier is part of the western Greenland Ice Sheet (GrIS) that once extended at least as far west as the modern coastline some 90 km west of Kangerlussuaq. The present ice margin stops 40 km northeast of the town of Kangerlussuaq. Specifically we will address the following questions: (1) When is the earliest time the modern coastline was ice free?, (2) How does this event fit into the regional climate trend (warming, cooling), (3) What are the glacial dynamics implications of this findings (advancing ice sheet during warm period, retreating ice sheet during cold period, or vice versa)?, (4) How thick was the ice sheet in the region?, (5) What is the speed at which the western GrIS is retreating? To answer these questions we will: (1) sample glacial features (erratic boulders, bedrock) and construct the deglacial chronology of the western GrIS along a transect from the coastline to the ice margin following the well-marked glacial path; (2) sample the highest summits in the area to constrain the height of the ice sheet during its last former extent; (3) map and analyze glacial erosional features and marks using field methods; (4) analyze spatial distribution and morphology of glacial landforms and features using remote sensing data and Geographic Information System (GIS). The methodological merit of this work will be (1) to develop a direct chronology of the western margin of the GrIS, (2) to obtain valuable information about the thickness of the ice sheet.