

SNAPSHOT

Greenland migrations track temperature trends

Sudden shifts in climate coincided with several human migrations in and out of Greenland during the past five millennia, a study shows.

Although much of Greenland is covered with a kilometres-thick ice sheet, small populations have long lived on the ice-free fringes of the island, in particular along the southwestern coast. Although many teams have used cores drilled from the peak of the ice sheet to infer the island's past climate, none have compiled a temperature record for the regions where people actually live — until now.

William D'Andrea, a palaeo-climatologist at the University of Massachusetts in Amherst, and his colleagues looked at sediment

samples drilled from two small lakes near Kangerlussuaq, a settlement in southwestern Greenland that lies about 100 km inland (*Proc. Natl Acad. Sci. USA* doi:10.1073/pnas.1101708108; 2011).

Carbon dating suggests that these sediment cores chronicle climate in the region for the past 5,600 years.

The researchers looked at organic chemicals called alkenones, which are produced in the cell walls of algae that proliferate in the lakes from mid-June to mid-July each year. The degree of unsaturation of these compounds — which end up in sediments when algae die and fall to the lake bottom — is an indicator of water temperature, which in turn reveals air temperatures above the lakes, the scientists

say. Their analyses show that average mid-summer temperatures near Kangerlussuaq varied overall by as much as 5.5 °C over the past 5,600 years, and sometimes shifted dramatically over relatively short intervals.

The temperature record shows that Greenland was in the midst of a long-term warming trend when the Saqqaq, the first known inhabitants of western Greenland, arrived about 4,500 years ago. That culture persisted until about 2,800 years ago, when the record shows that mid-summer temperatures dropped about 4 °C over 200 years to about 5 °C — a cooling spell that was much larger, but no more abrupt, than previous changes in climate, the researchers note. After the Saqqaq left, the Dorset people — who hunted sea-mammal prey on sea ice with spears — moved into the area and thrived for at least 600 years.

The team's temperature reconstruction suggests that between 1,150 and 850 years ago, which coincides with when the Norse people migrated to Greenland and established farms, summers were a balmy 6–8 °C. Then came a sharp downturn in mid-summer temperatures — a drop of about 4 °C in just 80 years — that persisted for several centuries. The farming Norsemen finally left the region around 1350.

Although factors such as conflicts and trade relations with neighboring regions obviously affected human migrations to and from Greenland, abrupt changes in climate surely played a major role in these comings and goings as well, the researchers say.

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