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The Davis Strait Arctic Gateway: Ocean Circulation and West Greenland Climate since the Last Glacial Maximum (DASAG)

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As one of the major areas of deep-water formation the Labrador Sea is an important component of the present-day North Atlantic thermohaline circulation (THC) system. Furthermore, the Labrador Sea is particularly sensitive to freshwater forcing, as enhanced freshwater fluxes will favour sea-ice formation and lead to a reduction of deep-water convection. The surface circulation is characterised by the West Greenland Current (WGC), which flows northwards along the Greenland coast, entraining at subsurface depth relatively 'warm' and saline Atlantic water from the Irminger Current as well as cold, low-salinity surface water originating from the East Greenland Current. There is also a significant freshwater input to the WGC from the Greenland ice sheet. Along the Canadian coast, the Baffin-Labrador Current transports cold, low-salinity Polar Water south into the Labrador Sea. The deep circulation over the northern slope of the Labrador Sea is made of two main components: a more baroclinic current with its centre between 2000m and 1000m, and a more barotropic current centred near the 2500 m isobath, the latter being part of the large-scale North Atlantic subpolar gyre circulation also transporting overflow waters originating from the Nordic Seas (the

Western Boundary Undercurrent, WBUC).

Within the framework of the DASAG project, we reconstruct sea-surface conditions and deep-water circulation variability in the Baffin Bay - Northern Labrador Sea region off the coast of West Greenland since the Last Glacial Maximum. Particular attention is given to the influence of the West Greenland sea-ice and iceberg environment and possible linkages with large-scale North Atlantic thermohaline circulation. We use a multi-disciplinary approach based on a variety of proxy data (sedimentological, magnetic and micropalaeontological) from a series of cores reaching from SW Greenland fjords near Nuuk, across the Davis Strait and into the Disco Bay in the north. We will present here results, which highlight the palaeoceanographic and palaeoclimatic history of the region since the last Glacial maximum, while detailed records of each locality are presented separately.

Sediment cores from the deep northern Labrador Sea and the Davis Strait reveal a high resolution record of the water exchange between the Baffin Bay and the Labrador Sea. During the Last Glacial Maximum, Atlantic deep water (WBUC water) masses were found in the northern Labrador Sea. The WBUC activity was enhanced immediately prior to H1. During the Younger Dryas, Atlantic water entrained by the WGC reached the shallower central Davis Strait. Cores from fjords near Nuuk and Disko Bay give a detailed record of the Holocene period, particularly the late Holocene. At about 3200 cal. years BP neoglacial cooling started to influence the area, and since that time the WGC repeatedly displayed major changes both in surface water transport and subsurface entrainment of Atlantic water. One of the notable features in the Disko Bay record is lacking evidence of Mediaeval warming.