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Oceanographic regimes in the northwest Labrador Sea since Marine Isotope Stage 3 based on dinocyst and stable isotope proxy records

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To reconstruct sea surface temperature (SST) and salinity in the northwest Labrador Sea and infer upper water column structure, we applied the modern analogue technique to dinocyst assemblages in combination with stable isotope data from *Neogloboquadrina pachyderma* sinistral (Npl) in a piston core raised off Hudson Strait (HU2008-029-004PC). Three oceanographic regimes were identified, broadly corresponding to the "glacial", "late deglacial" and "post-glacial" intervals. The site remained apparently under the direct influence of the Laurentide Ice Sheet (LIS) margin until ∼12.2 cal ka BP. It did not record the Bølling-Allerød warming and weakly recorded the Younger Dryas event. The "glacial" regime thus lasted until ∼12.2 cal ka BP and is characterized by sparse dinocysts in the sedimentary record indicating nearly perennial sea ice. Under the "deglacial" regime (ca. 12.2-8.3 cal ka BP), increased productivity and dinocyst assemblage compositions are interpreted as responses to an increased North Atlantic water inflow. Warm summer (∼11˚C) and low winter SSTs, sea ice cover during about 3.5 months per year, and low salinity (∼28) suggest the persistence of a strongly stratified surface water layer caused by continuous meltwater supplies from the LIS. Following the final drainage of glacial Lake Agassiz through Hudson Strait (dated here at ∼ 8.3 cal ka BP), and the subsequent LIS collapse, increased salinity (up to ∼35) was accompanied by a reduced seasonality with increased winter (∼3.8˚C) and decreased summer (∼8.6˚C) SSTs. This weakened stratification of the surface water layer allowed for winter convection and Labrador Sea Water formation, as shown by increased $\delta^{13}C_{Npl}$ values in response to higher ventilation rates of the resulting intermediate water layer.