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Land-Sea relationships of climate-related records: example of the Holocene in the eastern Canadian Arctic and Greenland

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Important progresses have been made to reconstruct climate and ocean changes through time. However, there is often a hiatus between the land-based climate reconstructions and paleoceanographical data. The reconstructed parameters are not the same (e.g. surface air temperature vs. sea-surface temperature). Moreover, the spatial (local to regional) and temporal dimensions (seasonal, annual to multi-decadal) of proxy-data are often inconsistent, thus preventing direct correlation of time series and often leading to uncertainties in multi-site, multi-proxy compilations. Here, we address the issue of land-sea relationships in the eastern Canadian Arctic-Baffin Bay-Labrador Sea-western Greenland based on the examination of different climate-related information from marine cores (dinocysts) collected nearshore vs. offshore, ice cores (isotopes), fjord and lake data (pollen). The combined information tends to indicate that "climate" changes are not easily neither adequately captured by temperature and temperature shifts. However, the seasonal contrast of temperatures seems to be a key parameter. Whereas it is often attenuated offshore, it is generally easy to reconstruct nearshore, where water stratification is usually stronger. The confrontation of data also shows a relationship between ice core data and sea-ice cover and/or sea-surface salinity, suggesting that air-sea exchanges in basins surrounding ice sheets play a significant role with respect to their isotopic composition. On the whole, combined onshore-offshore data consistently suggest a two-step shift towards optimal summer and winter conditions the circum Baffin Bay and northern Labrador Sea at 7.5 and 6 ka BP. These delayed optimal conditions seem to result from ice-meltwater discharges maintaining low salinity conditions in marine surface waters and thus a strong seasonality.