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Early Holocene meltwater events in the Labrador Sea

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During the early Holocene, the Labrador Sea was strongly influenced by the presence of the remainder of the Laurentide Ice Sheet and its active eastern margin. Glacial advances and retreats lead to episodic release of meltwater and icebergs with potential impact on ocean circulation and climate during the deglaciation. The purpose of this study is to use detrital carbonate (DC) records in the Labrador Sea to study the spatial variability of the carbonate events and inferred sources and routing of glacial meltwater originating from Hudson Strait (HS) as well as potential contributions from Northern Baffin Bay (NBB) ice sheet margins. We use DC in sediment cores as a proxy for glacial meltwater and ice berg drift from these areas. More than 20 sediment cores with published DC, stable oxygen isotope, and radiocarbon stratigraphies provide the data for this study. Our hypothesis is that the complex interplay of current systems, shelf and slope bathymetry and location of meltwater and ice berg injection points will affect the spatial distribution of the DC events. In addition, differences in local ocean reservoir age for shelf, slope and open ocean sites may also contribute to offsets in the apparent ages of DC events. Identification of DC peaks also is influenced by sedimentation rates and sampling resolution. To objectively correlate DC events, we study mostly published core data, removing all earlier assumptions about marine reservoir ages and assess all core chronologies with their associated errors. Our results show that none of the DC events is found in all sites and no record captures all of the DC events. Despite this, some of the larger events occur in several records and allow robust temporal and spatial mapping of the meltwater pathways. Besides the meltwater route due south along the Labrador margin on the shelf, some events show a clear signal in deeper Labrador Sea sites pointing at a more direct injection of freshwater in the subpolar gyre.