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Holocene sea-ice and ocean temperature evolution on the continental margin off northeastern Svalbard

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During the last decades the Arctic has been exposed to large climate changes, e.g. increasing temperatures and reduced summer sea-ice cover. Sea-ice cover is also going through a regime shift from thick perennial multiyear ice to an increasingly seasonal sea ice cover in the Arctic Ocean. Yet little is still known of the both the short- and long-term effects on the climate-ocean systems. Here we present Holocene ocean temperatures and sea-ice reconstructions from the continental margin off northeastern Svalbard using fauna data and stable isotopes (d18O, d13C) from benthic foraminifera in addition to sea-ice biomarkers, e.g. IP25 and HBI III. The results show that the sea ice decreased abruptly after mid Younger Dryas. The sea ice record also shows robust evidence of seasonal sea ice throughout the entire Holocene off NE Svalbard, including during the Holocene climate optimum. Sea ice records from NE Svalbard and the western Barents Sea reflect relatively greater influence of inflowing Atlantic water in contrast to central northern Barents Sea, which appears to be more influenced by the increased length of winter and spring throughout the Holocene. This study shows that the estimate of spring sea ice concentrations at NE Svalbard has an overall increase throughout the Holocene. The trend seem to follow the d18O values reflecting bottom water temperatures at NE Svalbard. The increasing bottom water temperatures during early Holocene is a regional signal due to increased inflow of Atlantic water. The d18O data from NE Svalbard covering the early Holocene follow the same overall pattern as in the western Barents Sea. This may suggest a common development of bottom water temperatures along the main pathway of northward flowing Atlantic water during the early Holocene.