Unravelling Massive Meltwater Events: Fennoscandian Ice Sheet and Its Potential Role in North Atlantic Heinrich Events

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The Baltic Sea-Skagerrak region displays strong connections with North Atlantic climate during recent glacial-interglacial cycles. However, a detailed assessment of this linkage has been hindered by the lack of continuous, high-resolution paleoclimate records from the Baltic region. Sediment cores collected during IODP Expedition 347 have begun to fill this need; located adjacent to the Fennoscandian Ice Sheet (FIS) during the latest deglaciation, these cores provide an ultra-high resolution record that may reveal insights into environmental changes during this dynamic time period.

Our study focuses on deglacial benthic foraminiferal stable oxygen and carbon isotopes, trace elements, and species assemblages from IODP Site M0060, located close to the Island of Anholt in the Kattegat, covering the period approximately 17.6-13.3 thousand years ago (ka BP). At this site, three distinct deglacial phases were identified. Firstly, a significant rapid freshening event occurred around 17.5 ka, associated with the proximal ice margin. Subsequently, two relatively smaller freshening events transpired around 17 ka and 16.3 ka.

Between 17.6 and 15.5 ka, the environment exhibited fjord-like characteristics with strong vertical stratification, limited bottom-water ventilation, and sea-ice formation, leading to a salinity decrease of approximately 10 units. Between 15.5 and 13.3 ka, the environment became more saline, warmer, and better ventilated, beginning even before the Bølling-Allerød period. These recorded meltwater releases are suspected to be driven by fluctuations in the FIS. Notably, the freshening events at approximately 17 and 16.3 ka closely resembled large $\delta^{18}O$ excursions from the North Atlantic and Nordic Seas, suggesting that these events were not localized but instead affected extensive regions. We will discuss the potential links to Heinrich Event 1 and other larger hydrographic events.