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# Abrupt early Holocene changes in ice dynamics inferred from the Skytrain ice core sea salt record

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Ice cores drilled at sites closer to the Antarctic coast typically have relatively higher concentrations of salts because they are closer to sea salt sources (i.e., the open ocean, sea ice, and frost flowers). Holocene Antarctic ice core sodium variability has been attributed to changes in sea ice extent. In this study, sea salt was analyzed in the top 436 m (last 12,000 years before 1950) of an ice core from Skytrain Ice Rise, Antarctica (79°S, 78°W). The Skytrain ice core was drilled as part of the WArm Climate Stability of the West Antarctic ice sheet in the last INterglacial (WACSWAIN) project. Unlike other Antarctic ice core records, Holocene Skytrain ice core sodium increased abruptly by ∼40 ppb (a factor of ∼2 increase) and became much more variable in the early Holocene from ∼8000 to 7500 years BP (before 1950). This atypical sea salt increase could be indicative of a change in regional ice sheet dynamics in the Weddell Sea Sector. This possible change in sea salt sources is further investigated using the pTOMCAT atmospheric model and HYSPLIT air mass back trajectory analysis. The Skytrain ice core Holocene stable water isotope signal ($\delta^{18}$O) similarly increased abruptly by ∼3‰ from ∼8600 to 8300 years before present, about 500 years before the change in sea salt. We interpret these increases in terms of changes in the ice sheet elevation and ice shelf extent. Model reconstructions of the West Antarctic Ice Sheet (WAIS) assume that it retreated monotonically during the Holocene. Our findings support an abrupt regional change in ice dynamics in the early Holocene.

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