



Are Cryosphere-Driven Feedbacks a Requisite for Abrupt Climate Events?

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Abrupt climate events are generally believed to be characteristic of glacial (intermediate-to-large cryosphere) climate states, requiring either sizeable ice-sheets or large freshwater pulses to act as triggers for abrupt climate changes to occur. Amplification occurs when these triggers bear upon the Atlantic Meridional Overturning Circulation (AMOC). However, the focus on glacial climate states in abrupt climate change research has led to an underrepresentation of research into interglacial periods. It thus remains unclear whether high-magnitude climate variability requires large cryosphere-driven feedbacks or whether it can also occur under low ice conditions. Here we present a high resolution analysis of surface and deep water components of the AMOC spanning the transition from Marine Isotope Stage (MIS) 19c to 19a to test if orbital boundary conditions similar to our current Holocene can accommodate abrupt climate events. Sediment core DSDP 610B (53°13.297N, 18°53.213W), located approximately 700-km west of Ireland, was specifically chosen due to its high sedimentation rate during interglacial periods, excellent core recovery over the Quaternary and its unique geographical location. Above the core site, the dominant oceanographic feature is the North Atlantic Current and at 2417-m water depth, 610B is influenced by Wyville Thomson Overflow Water flowing southwards. A multiproxy approach including paired grain size analysis, planktic foraminifer assemblage counts, and ice-rafted debris counts within the same samples allows us to resolve the timing between both surface and bottom components of the AMOC and their response to abrupt climate events during MIS-19 in the eastern subpolar gyre. This study is societally relevant as future freshwater inputs from a melting Greenland ice sheet may impact ocean circulation, potentially causing shifts in climate for many European countries.