Geophysical Research Abstracts
Vol. 20, EGU2018-9005, 2018
EGU General Assembly 2018

Early interglacial legacy of deglacial climate instability

Stephen Barker (1), Stephen Conn (1), Sian Lordsmith (1), Dhobasheni Newman (1), and Gregor Knorr (2)
(1) Cardiff University, United Kingdom (barkers3@cf.ac.uk), (2) Alfred Wegener Institute, 27570 Bremerhaven, Germany

Throughout the last glacial cycle natural millennial scale variations in atmospheric CO_2 have occurred in response to abrupt changes in deep ocean circulation, which themselves are reflected by observable changes in surface conditions across the North Atlantic region; CO_2 tends to increase while the surface North Atlantic is anomalously cold and covered in rafted ice (conditions typically associated with Heinrich events) and decrease when conditions are anomalously warm and relatively ice free. We use continuous proxy records of NE Atlantic surface temperature and ice rafting to demonstrate that an equivalent relationship has held over the last 800kyr i.e. since before the appearance of Hudson Strait-type Heinrich events. Our results show that glacial terminations (deglaciations) are characterised not only by an interval of intense ice rafting, but also by a subsequent and abrupt shift to anomalously warm surface conditions, which we interpret to reflect an abrupt recovery of deep ocean circulation in the Atlantic. According to our analysis, this is followed by a period of enhanced overturning lasting thousands of years until equilibrium interglacial conditions are attained and during which atmospheric CO_2 is likely to decrease (following an interval of rising CO_2 associated with deglacial ice rafting). Our results therefore demonstrate that deglacial oscillations in ocean circulation can have a lasting influence on early interglacial climate and highlight the transient nature of atmospheric CO_2 overshoots associated with the onset of some previous interglacials. Accordingly we suggest that these intervals should be considered as a part of (or at least affected by) the deglacial process. This has implications for studies concerned with the evolution of atmospheric CO_2 during past interglacials as well as the Holocene.