

Millennial-scale rock-magnetic variation indicating instability of North Atlantic environments during MIS 100

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Ocean thermohaline circulation (THC) plays an important role in global climate change linked with continental ice sheets. To clarify the variation of ocean THC in the early stage of glaciations in the northern hemisphere, we studied a deep-sea sediment core with high sedimentation rate recovered at IODP Site U1314 in the North Atlantic. Rock magnetic study of the sediments during marine oxygen isotope stage (MIS) 100 indicated links between the millennial-scale variability in deep water circulation and iceberg discharge. The observed abrupt decreases of magnetic coercivity associated with ice-rafted debris (IRD) are interpreted to be reduced transport of high-coercivity material from Icelandic source indicating reduced formation of North Atlantic Deep Water (NADW). In these periods, a current from the south, Lower Deep Water, transports sediments with low magnetic coercivity contributed by coarse grained magnetite of continental sources. Repetition of vigorous and weakened NADW production linked to IRD was observed during MIS 100 in a similar manner to that in the last glacial suggests that the regime of climate change in the millennial-scale was already established in the early stage of glaciations in the northern hemisphere.

Keywords: rock magnetism, thermohaline circulation, North Atlantic Deep Water, Ice rafted debris