Geophysical Research Abstracts
Vol. 13, EGU2011-2757-2, 2011
EGU General Assembly 2011

Holocene Evolution of the Irminger Current: a Perspective from the Southwest Iceland Shelf

Ursula Quillmann (1), Anne E. Jennings (1), Tom M. Marchitto (1), Vivian Underhill (2), and John T. Andrews (1)
(1) University of Colorado at Boulder and INSTAAR, Department of Geological Sciences, United States (ursula.quillmann@colorado.edu), (2) University of Colorado at Boulder, Department of Environmental Studies, United States

The Irminger Current (IC), a branch of the North Atlantic Current (NAC), transports heat and nutrients to the Icelandic shelf. Variations in the water masses of the IC have been recently linked to variations in the water mass properties of the NAC, which in turn are affected by North Atlantic subpolar gyre (SPG) dynamics. Modern observations yield that the SPG oscillates between two modes: an extended and a contracted mode. In the extended mode, the SPG entrains more relatively cold and fresh polar waters, and in the contracted mode more relatively warm and saline subtropical waters. We use variability in temperature, the isotopic composition of seawater ($\delta^{18}O_{sw}$), and the nutrient content of the IC to reconstruct the Holocene evolution of the IC as it enters the Icelandic shelf.

We present preliminary results of Mg/Ca ratios measured on *Globigerina bulloides*, a planktic foraminifer, and *Cassidulina laevigata*, a benthic foraminifer, from core MD99-2259 (54° 37.0' N, 24° 26.58' W, 520 m water depth) from the southwest Iceland shelf. Core MD99-2259 lies in the flow path of the IC and therefore should monitor changes in the North Atlantic water mass characteristics, which we hypothesize originated from changes in SPG dynamics. The temperature is calculated from the measured Mg/Ca ratios and the calculated temperature is used to separate the $\delta^{18}O_{sw}$ contribution to the oxygen isotopic composition of *G. bulloides* and *C. laevigata*. We reconstruct paleonutrients from the Cd/Ca ratios in *G. bulloides* and *C. laevigata*. Cd/Ca ratios have been used to reconstruct paleonutrients because in modern sediments they correlate well with dissolved Cd in seawater, which resembles the nutrient PO_4. However, a potential temperature-dependence of the Cd/Ca of *G. bulloides* has been suggested. We present the Cd/Ca record and the calculated PO_4 record, which is corrected for temperature.

To test our hypothesis that changes in the water mass characteristics in the IC are linked to SPG dynamics, we compare our results with our SPG dynamic reconstruction of core NEAP4K from Björn Drift in the northern Iceland Basin south of Iceland (61° 29.91' N, 24°10.33' W, 1627 m water depth). NEAP4K lies near the present-day position of the eastern boundary of the SPG and thus likely monitors variations in SPG dynamics and the nutrient content of the Atlantic water masses. The NEAP4K results suggest that the SPG went generally from more extended modes in the early Holocene to more contracted modes towards the present with some millennial scale oscillations superimposed. The Cd/Ca record shows in general anticorrelations between temperature and nutrients. Higher nutrients generally are associated with an extended SPG mode, which is consistent with modern climatologial observations that the SPG has higher [PO_4] than the subtropical gyre.