



Nutrient and carbonate ion change at intermediate depth North West Atlantic: a record from a 15.4ky *D. dianthus* fossil coral

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Recovery from ice age conditions during the last deglaciation is known to have occurred discontinuously, with step-wise increases in sea-level, and uncertain, possibly short-term reorganizations of circulation in the Atlantic Ocean. We applied recently calibrated P/Ca and U/Ca proxies (Anagnostou et al., in review) to a fossil *D. dianthus* coral from the northwest Atlantic (1800m), U-Th dated to 15.4ky calendar age. This specimen captured a radiocarbon age reversal, with the biologically younger end of the skeleton being older in radiocarbon age than the base of the coral (Adkins et al., 1998), attributed to an abrupt event leading to change in the ventilation age of the ambient seawater. Our results allow for the first time an estimate of seawater phosphate concentrations; phosphate increased within one century from concentrations near modern values for this location ($1.1 \mu\text{mol/kg}$) to substantially higher concentrations after the event ($1.7 \mu\text{mol/kg}$), a relative change consistent with previously determined gradients of Cd/Ca in the same coral. In addition, our modern calibration of U/Ca against seawater carbonate ion concentration indicates that $[\text{CO}_3^{2-}]$ decreased by 30% following this event. We conclude that P enriched, CO_3^{2-} depleted Southern Source Water (SSW) flooded the coral location at 15.4ky, displacing a mixture of glacial North Atlantic Intermediate (GNAIW) and SSW. Such an increase was not observed in a slightly older and deeper coral, suggesting the rapid nature of the event. Four corals from the same location with preliminary dates matching Heinrich Event 1 (16.8ky) show similar P/Ca to the post-15.4ky coral, suggesting that the 15.4ky and Heinrich 1 events share similar intermediate depth water mass composition.

Adkins et al. (1998). Deep-sea coral evidence for rapid change in ventilation of the deep North Atlantic 15,400 years ago. *Science* 280, 725-728.

Anagnostou et al. (in review). Seawater nutrient and carbonate ion concentrations recorded as P/Ca, Ba/Ca, and U/Ca in the deep-sea coral *D. dianthus*. *Geochim. Cosmochim. Acta*.