Determining changes in North-Atlantic carbon cycling across abrupt climate events.

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Intervals of rapid climate change have long been linked to different modes of meridional overturning circulation (MOC), with slowdown driving rapid cooling. Some of these cooling events are also associated with the enhanced discharge of icebergs from the Laurentide ice sheet and a rise in atmospheric CO_2. While a number of records have shown evidence for a change in the strength and configuration of the MOC in the North Atlantic across abrupt climate events, there are limited studies determining how this would affect the partitioning of carbon between the surface and deep ocean. Here we use coupled measurements of the boron isotope ($\delta^{11}B$) and radiocarbon (^{14}C) composition of foraminifera to trace carbon cycling in the North Atlantic and its exchange with the atmosphere over the last deglaciation. The importance of the overturning circulation strength on the magnitude of surface water radiocarbon reservoir ages in the North Atlantic means that this parameter is sensitive to changes in deep-water formation through time. Meanwhile boron isotopes provide insights into Atlantic carbon storage and release through millennial scale climate events. We present new high-resolution radiocarbon reservoir age estimates from four cores in the north Atlantic: ODP Site 983, Site 980, DAPC2 and EW9302-2JPC coupled with $\delta^{11}B$ from ODP Site 980. Based on the new data, we present a model of ocean circulation and carbon cycling during millennial scale climate events that is consistent with the shifts observed in radiocarbon, $\delta^{11}B$ and $\delta^{13}C$ over the deglaciation.