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Deep ocean sedimentary CaCO3 over the last glacial-interglacial cycle.

Babette Hoogakker (1), Harry Elderfield (1), and Andy Ridgwell (2)

(1) University of Cambridge, Earth Sciences, Cambridge, United Kingdom, (2) Bristol University, School of Geographical Sciences, Bristol, United Kingdom

Sedimentary CaCO3 contents provide important information about changes in ocean chemistry and atmospheric CO2, modulated by carbonate compensation. Typical Atlantic and Pacific downcore wt% CaCO3 records, show reversed preservation patterns during glacials and interglacials. These patterns have been attributed to 1) glacial incursion of carbonate ion undersaturated Southern Sourced bottom waters into the North Atlantic up to $\sim$ 2.5 km, and 2) glacially slightly increased carbonate ion undersaturated Southern Sourced bottom waters causing a deepening of the lysocline in the Pacific (Rickaby et al., in press).
We present the results of a synthesis of marine CaCO3 records covering the last glacial-interglacial cycle (0-150,000 years). All records are synchronized to a common d18O age scale. Our reconstructed distribution of Atlantic and Pacific type CaCO3 records reveals that the Pacific type is observed all along the equatorial Pacific as well as in the deep (< 4000 m) South Atlantic. The Atlantic pattern is observed in most of the Atlantic, Southern Indian Ocean and intermediate South Pacific, as well as the western North Pacific. For the non-Atlantic sites as well as some North Atlantic sites situated within the glacial ice rafted debris and dust belts, dilution with terrigenous material likely dominates the CaCO3 records, rather than sea water chemistry. Many 'Atlantic-type' records, south of the equator in the Atlantic lack low CaCO3 during glacial stage Marine Isotope Stage (MIS) 2 but not MIS 4 and 6. Using the 3-D ocean based "Grid ENabled Integrated Earth system model" (GENIE-1) several hypotheses are tested to explain the observed sedimentary patterns, including changes in ocean circulation, export production, dilution with detrital material.

Rickaby, R. E. M., H. Elderfield, N. Roberts, C.-D. Hillenbrand, and A. Mackensen (in press), Evidence for elevated alkalinity in the glacial Southern Ocean, Paleoceanography, doi:10.1029/2009PA001762.