



North Atlantic Plio-Pleistocene sediment color climate index indicates enhanced 41-k.y. world variability

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Sediment color variations at North Atlantic Site DSDP609/U1308 exhibit a very similar pattern to the water isotope record of the North GRIP ice core. Moving window cross correlation between NGRIP oxygen isotopes and sediment lightness (L^*) reveals a consistently high and significant correlation. Based on this relationship, we construct a color-based climate index by calculating color reflectance values from the shipboard line-scanner images. Use of the line-scanner images provides a higher-resolution series (0.01 cm) than the 2-cm shipboard spectrophotometer data and permits for manual removal of disturbed pixels prior to analysis. At present, the composite benthic oxygen isotope and paleomagnetic records at Site U1308 extend to MIS K2, providing age control beyond 3 Ma. The same approach at a more northerly location (IODP Site U1304) yields very similar results, in terms of event pattern, timing, and duration, over the past few glacial cycles, suggesting the much longer Site U1308 record likely reflects conditions over a relatively large spatial area.

Rapidity of color variations decreases following the onset of the large amplitude 100-k.y. glaciations. Both Sites U1304 and U1308 exhibit near identical color changes during the penultimate glaciation (MIS 6), which is characterized by fluctuations that are among the most gradual of the entire ~ 3 Ma record. With the exception of MIS 6, results generally agree with the synthetic Greenland isotope record. Orbital scale color variations are near synchronous with benthic oxygen isotopes at a 41 k.y. period but lag significantly at 100 k.y.