

Climate Center Grant Report

Awarded to: Katherine Allen and Bärbel Hönisch, December 18, 2009

“Ground-truthing the B/Ca proxy in tropical planktic foraminifer shells: Investigating the effects of pH, temperature, salinity and carbonate ion”

This grant enabled us to conduct plankton culture experiments in Puerto Rico for two months in 2010. We used the \$8,000 award to cover the bulk of our transportation and laboratory expenses. At the Marine Science center on Isla Magueyez, we grew planktic foraminifers under a range of seawater conditions, and collected their calcite shells for later compositional analysis. Our work resulted in new calibrations of proxies for past ocean chemistry. A major result was new insight into what controls boron incorporation into foraminiferal calcite. The boron content of these shells is thought to be linked to seawater carbonate chemistry (a major factor in the global carbon cycle). Our new data confirm this link, but reveal different controls that require re-interpretation of existing B/Ca records. Overall, these results represent a significant step forward in our understanding of the B/Ca proxy.

Samples derived from this field work comprise a large part of Kat Allen’s Ph.D. thesis. Results have been presented at the 2011 AGU Fall meeting, and are currently being written up for publication. Additional samples (in progress) will contribute to our understanding of the $\delta^{11}\text{B}$ proxy for seawater pH and the Mg/Ca proxy for surface seawater temperature. Finally, this Climate Center grant not only helped Columbia-based scientists, but enabled an international field collaboration (with researchers at The Australian National University) from which many students and young scientists benefited.

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