Effects of Changes in Ocean Circulation and Hydrothermal Vent Activity on the B/Ca Proxy in Benthic Foraminifera

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The boron to calcium ratio (B/Ca) and boron isotopic composition of the benthic foraminifer *C. wuellerstorfi* have become frequently used proxies for reconstructing carbonate chemistry in ocean bottom waters. Across the mid-Pleistocene transition (MPT, 1.2-0.8 million years ago) it has been hypothesized that changes in ocean circulation significantly affected deep ocean carbon storage and carbonate chemistry. During the MPT, the periodicity of glacial-interglacial cycles changed from 41 thousand years to 100 thousand years (Kyr) and glacial intervals became more prolonged and intense. Our study presents new data of boron-calcium ratios in *C. wuellerstorfi* to reconstruct deep ocean carbonate chemistry during the mid-Pleistocene transition in the western equatorial Atlantic Ocean at ODP site 925 on the Ceara Rise (3,000 m water depth) in an effort to understand changes to deep Atlantic ocean carbon storage and ocean circulation across the MPT. Our results show that carbonate chemistry at the Ceara Rise during the mid-Pleistocene transition is significantly influenced by the accumulation of respired CO_2 below 3,000 m water depth via changes in ocean circulation or activity of the biological pump. We also investigate the validity of the B/Ca proxy at a site proximal to a hydrothermal vent system. Elevated boron isotope data from a site proximal to the Clipperton Fracture Zone on the East Pacific Rise have led to the hypothesis that boron derived from hydrothermal fluids may be incorporated into benthic foraminifer shells. Presented here is new *C. wuellerstorfi* B/Ca data from a sediment core 5 km west of the Juan de Fuca Ridge, North Cleft Segment, to study the influence of vent fluid chemistry and partial shell dissolution on B/Ca and other trace element ratios. Data from this ridge-proximal site does not show a strong hydrothermal signature on B/Ca across the last glacial cycle despite the elevated boron concentrations of modern vent fluids and close proximity to the ridge. Further study on B/Ca and other trace metals from the Ceara Rise and Juan de Fuca Ridge may allow for better insight into the mechanisms behind the MPT and the validity of the B/Ca proxy.