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# Biocalcification stress and a foraminiferal extinction at the Aptian-Albian Boundary

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The Aptian-Albian boundary interval (AABI) records diverse evolutionary and environmental disruptions, including Oceanic Anoxic Event 1b (OAE1b) and a major extinction of planktic foraminifera. These events played out against a backdrop of large-scale climatic and tectonic reorganization, including a transition into the mid-Cretaceous greenhouse and the emergence of new ocean gateways following the breakup of Gondwana. The most complete record of the AABI is preserved at Deep Sea Drilling Project (DSDP) Site 511 (South Atlantic). Studies of planktic foraminiferal assemblages at Site 511 provide evidence for major morphological turnovers across the AABI. Latest Aptian assemblages comprise large and heavily-calcified tests, while earliest Albian assemblages are composed of minute, thin-walled individuals. These changes coincide with the disappearance of 70-80% of Aptian planktic species. However, geochemical analyses have had limited success in resolving the causes of this turnover. Stable carbon isotope measurements record significant perturbations associated with OAE1b—in particular, a negative $\delta^{13}C$ excursion at the boundary attributed to volcanic $CO_2$ degassing. Meanwhile, stable oxygen isotope measurements of planktic forams at the Aptian-Albian boundary yield negative $\delta^{18}O$ values that imply unrealistically warm surface temperatures. Stable calcium isotope measurements of carbonates offer a novel tool to evaluate past environmental changes, including potential biocalcification stress and diagenesis. In particular, foraminiferal $\delta^{44/40}Ca$ values appear sensitive to ocean acidification via biological compensation. The dramatic shifts recorded in the abundance and morphology of AABI planktic foraminifera suggest that the $\delta^{44/40}Ca$ proxy may aid in understanding the drivers of such evolutionary changes. We present high-precision $\delta^{44/40}Ca$ TIMS measurements of Aptian-Albian planktic and benthic foraminifera and bulk carbonates from DSDP Site 511—together comprising the first calcium isotope records for this interval. Preliminary bulk $\delta^{44/40}Ca$ measurements recover a negative shift (implying an increase in alkalinity) contemporaneous with negative $\delta^{13}C$ and $\delta^{18}O$ excursions at the boundary. We use a foraminiferal $\delta^{44/40}Ca$ record to further test for biocalcification stress in response to a shoaled CCD during the AABI, in addition to diagenetic alteration of bulk $\delta^{44/40}Ca$. This work will advance understanding of the AABI and OAE1b as ancient analogs for modern global warming and ocean acidification.