Goldschmidt 2017 abstract

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Abstract:

In the Atlantic Ocean, the barium isotopic composition ($\delta^{138}Ba$) of barium dissolved in seawater is largely controlled by broad-scale ocean circulation [1, 2, 3]. Barium isotope ratios in foraminifera, which incorporate barium into their calcium carbonate shells from ambient seawater, could therefore potentially be used as a new record of past ocean circulation. Alternatively, planktic foraminifera dwelling in the near-surface might be used to track changes in biological productivity, given that barite precipitation (which is linked to organic matter production [e.g. 4]) leaves an imprint on seawater $\delta^{138}Ba$ at near-surface depths [1, 3]. Presented here are barium isotope ratios measured in the planktic foraminifer *Orbulina universa*. The foraminiferal $\delta^{138}Ba$ values show a variable offset from seawater $\delta^{138}Ba$, indicating that either: a) seawater $\delta^{138}Ba$ is variable within the habitat of this species; b) other factors are at play which influence foraminiferal $\delta^{138}Ba$ in addition to seawater $\delta^{138}Ba$, such as vital effects (e.g. photosynthetic activity of symbionts or differences in calcification mechanisms between morphotypes), temperatures or seawater barium concentrations; or c) a combination of both aspects. Further work is needed in order to define a robust relationship between foraminifer and seawater $\delta^{138}Ba$ and to thus develop new palaeoceanographic tools. This further work could include $\delta^{138}Ba$ measurements of the different morphotypes of *O. universa*, of additional species and of forams living under more closely-defined conditions (for example, those grown in laboratory culture experiments or collected from sediment traps) in combination with high-resolution seawater $\delta^{138}Ba$ measurements.

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