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# Seawater stable strontium isotope fluctuations over glacial/interglacial cycles

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The stable strontium (Sr) isotopic composition ($\delta^{88/86}$Sr) of seawater has recently been shown to have fluctuated systematically over the past 35 million years, indicating a dynamic ocean Sr budget [1]. The data also revealed that Holocene core-top barites have higher $\delta^{88/86}$Sr than the average value of samples representing the past ~2.5 Myr, providing support for the hypothesis that the modern ocean Sr budget is in disequilibrium due to increased post-glacial weathering and/or increased carbonate deposition on continetal shelves during high stand sea level [1-4]. We hypothesize that transient changes in the ocean Sr inventory and seawater $\delta^{88/86}$Sr occurred over glacial/interglacial cycles primarily in response to shifting carbonate burial between neritic (primarily Sr-rich aragonite) and pelagic (primarily Sr-poor calcite) environments. During high sea level stands, increased precipitation of aragonite on continental shelves would decrease the ocean Sr inventory while increasing seawater $\delta^{88/86}$Sr since carbonate preferentially incorporates light Sr ($\Delta_{carb\text{-}sw}$ = -0.18‰). During glacial periods, weathering and recrystalization of exposed shelf carbonates would add isotopically light Sr to the ocean.

To test this hypothesis, we measured $\delta^{88/86}$Sr and radiogenic Sr ($^{87}$Sr/$^{86}$Sr) in marine barite, a mineral that forms in the water column and records both seawater $^{87}$Sr/$^{86}$Sr and $\delta^{88/86}$Sr (with a constant offset of 0.53‰) [1,5]. Box model scenarios which test the response of the ocean Sr budget to variable glacial/interglacial weathering-recrystalization fluxes and partitioning of carbonate burial between continental shelves and the deep ocean indicate that significant fluctuations in the Sr inventory could occur. Preliminary results from the past 0.5 Myr show considerable variability consistent with model results.

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