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Mg isotope fractionation in shells of the bivalve *Glycymeris*

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The Cenozoic cooling that occurred over the past 50 Ma was accompanied by an increase of Mg/Ca in seawater and how this change in seawater chemistry is linked to climate change is still disputed. Mg isotope ratios of seawater could distinguish several possible causes including dolomitization, authigenic clay formation and changes in rates of silicate- and carbonate weathering. Previous reconstructions of Mg isotope ratios of paleo-seawater were based on foraminifera, corals or carbonate muds, and they yielded conflicting results. Thereby, in this study we assess the suitability of bivalves from genus *Glycymeris* as archives for paleo-seawater δ^{26}Mg (the standardized ^{26}Mg/^{24}Mg). Their potential advantage over other archives arises from their strong evolutionary conservatism, thick shells and fossil record dating back to the Lower Cretaceous, suggesting a high potential for invariant isotope fractionation factors through geological time. We report Mg isotope signatures from the ventral margins of shells of three recent *Glycymeris* species (*G. bimaculata*, *G. nummaria*, *G. pilosa*) from the Adriatic Sea that show an increasing fractionation with increasing ontogenetic age. Similar isotope signatures are observed within individual shells, where samples of the same ontogenetic age show distinct differences depending on whether they are located in the center or at the margins of the shell. Our results show that variations in precipitation rates best explain this behavior of Mg isotopes. Unaltered isotope signatures in fossil shells can thus be clearly identified. This work suggests that the rate-dependence of δ^{26}Mg in *Glycymeris* can be exploited to derive paleo-seawater δ^{26}Mg.