A record of seawater Li isotopes in well-preserved fossil corals since the Mesozoic

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Records of the lithium isotopic composition (δ^7Li) of seawater may provide important information about the role of silicate weathering and hydrothermal processes in the geological carbon cycle. Lithium isotope values measured in plankton foraminifera tests imply a significant (~9‰) rise in the lithium isotopic composition of seawater over the Cenozoic (*1*, *2*). However, foraminifera archives of seawater δ^7Li may be susceptible to vital effects (*3*, *4*) and diagenesis. Here we present a discrete record of δ^7Li from 30 well-preserved scleractinian fossil corals with aragonite mineralogy extending back to the Mesozoic. We infer seawater lithium isotopic composition using an empirically and experimentally established isotopic fractionation (Δsw-coral = 12‰) for coral aragonite precipitated from seawater (*5*, *6*). The first-order trend of our record implies a gradual 10‰ rise of seawater δ^7Li since the Jurassic. Gaps in the record allow the possibility of higher order variability on top of this first order trend. This record is consistent with a significant rise in seawater δ^7Livalues over the Cenozoic inferred from the foramifera record, but suggests a seawater δ^7Li composition ~2‰ higher than the foraminifera record during the Paleocene-Eocene. The low infered δ^7Li composition of seawater in the Jurassic (~21‰) reported here also places a new constraint on weathering and hydrothermal processes during the mid-Mesozoic and may help to elucidate controls on the geological carbon cycle.

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