Geophysical Research Abstracts
Vol. 21, EGU2019-4566-2, 2019
EGU General Assembly 2019

Magnesium isotopic compositions of the reef carbonates from the Xisha Islands, South China Sea: Implications for global Mg cycle

Dongjie Bi (1), Shikui Zhai (1), Xiaofeng Liu (1), Daojun Zhang (2), Xinyu Liu (2), Aibin Zhang (1), and Xia Zhang (1)

(1) College of Marine Geo-sciences, Ocean University of China, Qingdao, China (bidjouc@sina.com), (2) Zhanjiang Branch Institute of China National Offshore Oil Corporation (CNOOC) Limited, Zhanjiang, China

Mg isotope composition (δ^{26}Mg) of seawater may serve as a tool for reconstructing the global Mg cycle over geologic time scales. Marine carbonate sediments have been proposed as a potential archive for seawater δ^{26}Mg values. However, the Mg isotope composition of seawater in the Cenozoic has remained controversial. Here we report our investigation on the Mg isotope compositions of reef carbonates from the well "Xike-1" reef core in the Xisha Islands, South China Sea. Magnesium isotope analysis was complemented by analyses of Sr-C-O isotopic compositions, major and trace element concentrations, and mineral compositions. The δ^{26}Mg values in limestones from the well "Xike-1" reef core range from -5.03‰ to -3.60‰ and the δ^{26}Mg values in dolostones range from -2.98‰ to -2.72‰Ṁultiple lines of evidence consistently indicated that biological vital effects are likely the main factor controlling the variations of δ^{26}Mg values in limestones, which results in a lager Mg isotopic variation and a lighter δ^{26}Mg value in the limestones. Mg isotopic compositions of the dolostones from the well "Xike-1" reef core are conservative during diagenesis, which is the effective archive of seawater δ^{26}Mg values. The seawater δ^{26}Mg values are basically invariant during the past 21 Myr. The fractionation factor of Mg isotope between dolomite and fluids associated with dolomitization ranging from -2.26‰ to -2.02‰Ṁoreover, the Mg isotopic fractionation between calcite and fluids should range from -4.20‰ to -2.77‰İn this article, it is likely that the ocean is at steady state with respect to seawater Mg isotopic composition in the past 21 Myr. The mass balance calculation of Mg isotopes implies that the Mg flux of dolomitization output is about 0.63-0.79 Tmol/yr in the modern ocean, which accounts for about 12%-13% of the Mg flux of riverine input to the ocean.