

Mg isotope geochemistry in the middle to late the Cambrian Machari Formation by various diagenesis

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Although magnesium (Mg) isotopes has been widely used in recent years to determine the origin and diagenetic history of marine carbonates in paleo environments, there were no scientific information on Mg isotopes for the Cambrian carbonates. Here, we measured Mg isotope compositions of carbonates in the Machari Formation that was deposited at carbonate ramp of the middle to late Cambrian age and suffered various diagenesis process. All samples are categorized by four petrographic components (limestone I and II, dolomitic limestone, and dark gray calcareous shale) and separation of limestone I and II is possible by portion of microsparry (crystal sizes $\leq 20\mu\text{m}$) and sparry (crystal sizes $\geq 20\mu\text{m}$) calcite. Wide range of both limestone I and II (-2.69 to -1.00‰ in $\delta^{26}\text{Mg}$) indicate that limestone was sensitive by diverse diagenesis with $^{87}\text{Sr}/^{86}\text{Sr}$ and Mn/Sr ratios. Heavy $\delta^{26}\text{Mg}$ values in dolomitic limestone ($-1.30 \pm 0.32\text{‰}$, 2σ) were effected by dolomitization and not altered by post diagenesis due to fast Mg isotopic fractionation. The results of the Machari Formation can predict that Mg isotopic composition in the Cambrian seawater may be heavier because heavier average of $\delta^{26}\text{Mg}$ value ($-2.04 \pm 0.88\text{‰}$, 2σ) in limestone samples is heavier than that ($-3.60 \pm 0.50\text{‰}$, 2σ) in Moicene limestone. In addition, the estimated $\delta^{26}\text{Mg}$ value in the Cambrian seawater is consistent with Mg fractionation factor for dolomitization (0.9980 to 0.9975). This study suggest that Mg isotope in carbonate is useful tool for interpreting paleo environment of seawater despite the various diagenesis.