δ^{88}Sr and ^{87}Sr/^{86}Srrecords of the Middle-Late Permian seawater: mass extinction-relevant change in ocean Sr budget

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As Sr isotope compositions in seawater are globally homogeneous, these proxies are useful in checking marine Sr budget change in direct link to global calcium cycle. ^{87}Sr/^{86}Sr valueis mainlydriven by two input fluxes to seawater; riverine flux connected with weathering of time-integrated radiogenic old continent and hydrothermal input flux derived from less radiogenic mantle. δ^{88}Sr in seawaterreflects marine calcium carbonate input/output flux. The marine Sr budget changed dramatically, in particular, during the Guadalupian (Middle Pemian), with the lowest value of seawater ^{87}Sr/^{86}Sr in the Phanerozoic, i.e., “the Capitanian minimum”. This likely reflected a major global environmental change associated with the end-Guadalupian mass extinction. Likewise, the δ^{88}Sr started to decrease in the Early Permian, and reached the Phanerozoic lowest value at the end of Capitanian (late Guadalupian). We measured δ^{88}Sr values of the Middle-Upper Permian marine carbonates with detailed biostratigraphy by TRITONTIMS, with correction of isotope fractionation during mass spectrometry with ^{87}Sr-^{84}Sr double spike. Analyzed samples were from various localities in the world, e.g., the Akasaka paleo-atoll limestone (Japan), and shelf carbonates in S. China. These results confirmed that both in stable δ^{88}Sr and radiogenic ^{87}Sr/^{86}Sr ratios, low values remained throughout the Guadalupian, whereas they increased in the Wuchiapingian. The extremely low δ^{88}Sr value in seawater may reflect the increased dissolution of carbonates and/or reduced carbonate burial, i.e., enhanced carbonate weathering or suppression of reef building on shelf settings according to the coeval global sea-level drop.

Keywords: Permian, Sr isotope, carbonate

