

$^{87}\text{Sr}/^{86}\text{Sr}$ ratios in hydrous ferric oxide fractions in core sediments: High-resolution proxy for paleo-salinity variation of brackish lake water during the Holocene

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The $^{87}\text{Sr}/^{86}\text{Sr}$ ratio of carbonate shell fossil in sediment is used as a geochemical proxy of paleo-salinity [1]. Still, this method relies on finding grains that are large enough to pick. We carried out Sr isotopic measurement of carbonate and hydrous oxide fractions in annually laminated sediments of 20-m-long core, at 10 cm intervals, taken in 2009 at the deepest site (26 m) of Lake Ogawara (63 km²) [2] in northeast Japan. Very few carbonate sediments distribute in the watershed area. The significant difference in $^{87}\text{Sr}/^{86}\text{Sr}$ ratio between seawater (0.7092) and the average river water entering the lake (0.7065) produces a strong correlation between the $^{87}\text{Sr}/^{86}\text{Sr}$ ratio and salinity in lake water.

Here we applied a modified Tessier's sequential extraction method and tried to set the leaching time and to extract hydrogenous ferrihydrite and lepidocrocite, but not terrigenous goethite [3]. The vertical distribution pattern of the isotopic ratio in the hydrous oxide fraction of the core over the last 9000 years was significantly congruent with the preliminary diatom analysis. The shell fossil fragment, carbonate and hydroxide fractions in the stratum around 7,000 years ago showed the $^{87}\text{Sr}/^{86}\text{Sr}$ ratio in seawater. The isotopic fluctuation curves of both fractions overlap in the marine sediment layers, whereas in the brackish and fresh sediment layers, carbonate components faded away, and then hydroxide fraction can be the only host of the indicator. So, the $^{87}\text{Sr}/^{86}\text{Sr}$ ratio bound to hydrous oxide fraction in core sediments can be a robust high-resolution proxy of paleo-salinity fluctuation in the past bottom lake water during the Holocene.

[1] Ingram and Sloan (1993) *Science* **255**, 68–72. [2] Inagaki *et al.* (2012) *Appl Spectrosc.* **66**, 673–676. [3] Larsen & Postma (2001) *GCA* **65**, 1367–1379.