Molybdenum isotopes in marine hydrothermal Mn deposits

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Molybdenum isotopic compositions ($\delta^{98/95}$Mo) in ancient Mn-rich sedimentary rocks are currently receiving attention in studies assessing ocean paleoredox conditions [1, 2]. However, variations of $\delta^{98/95}$Mo among modern Mn-rich sediments have been poorly investigated.

To better undertand Mo isotope systematics of marine Mn deposits, we analyzed Mo isotopic compositions in a modern hydrothermal Mn deposit collected from the Ryukyu arc system [3]. The $\delta^{98/95}$Mo values ranged from –0.56 to –0.66‰ (against NIST SRM 3134). These values are ~2.7‰ lighter than the present-day seawater value, but smilar to those in modern hydrogenous Mn crusts [4]. The light values are consistent with the isotope offset observed during the adsorpition experiment of Mo onto Mn oxide, which was driven by coordination change of Mo from tetrahedral coordination to octahedral coordination [6]. As Mo in hydrothermal Mn crusts is octrahedrally coordinated [6], the observed light values can be explained by Mo isotope fractionation associated with a change in coordination number during the adsorption of seawater-derived Mo onto the Mn oxides, although the present data alone cannot rule out the possible contribution of hydrothermally derived Mo.

In the presentation, we will also report new $\delta^{98/95}$Mo data of other hydrothermal Mn deposits from different locations.

[1] Canfield *et al*. (2013) *PNAS* **110**, 16736-16741. [2] Planavsky *et al*. (2014) *Nat. Geosci*. **7**, 283-286. [3] Goto *et al*. (2015) *Mar. Geol*. **369**, 91-99 [4] Siebert *et al*. (2003) *EPSL* **211**, 159–171. [5] Wasylenki *et al*. (2011) *GCA* **75**, 5019–5031. [6] Kuhn *et al*. (2003) *Chem. Geol*. **199**, 29-43.