

## Copper isotope composition of seafloor hydrothermal vents in back-arc and arc settings, western Pacific

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We present the copper isotope signatures of hydrothermal vents collected from four different back-arc and island-arc settings in the western Pacific; the Eastern Manus Basin, the North Fiji Basin, the Northeastern Lau Basin, and the Tonga Arc.  $\delta^{65}\text{Cu}$  of thirty-one Cu-sulfides (mainly chalcopyrite) from seven venting sites range between -2.45 and +1.13‰. Molten sulfur containing covellite formed via volcanic sublimation [1] show very narrow  $\delta^{65}\text{Cu}$  values near 0‰, suggesting little or no fractionation occurred during the vapor transport of magmatic copper. Conversely, the spread of  $\delta^{65}\text{Cu}$  values observed in chalcopyrite of hydrothermal chimneys indicates significant fractionation of copper isotopes during their formation.

Formation of hydrothermal system in the convergent margin is characterized by higher contribution of magmatic volatile, such as  $\text{SO}_2$ , which results in enrichment of copper and other volatile metals. However, the copper isotope composition of chalcopyrite is not likely to be affected by the degree of magmatic contribution at the individual vent sites, which can be supposed by a lack of correlation between copper isotopes and sulfur isotopes. Therefore, the observed copper isotope variation can be attributed to the copper isotope fractionations during the alteration and redox reactions associated to the maturation of venting sites near surface (i.e. [2, 3]).

[1] Kim *et al* (2011) *Geology*, **39**, 351-354 [2] Rouxel *et al* (2004) *Economic Geology*, **99**, 585-600 [3] Pekala *et al* (2011) *Chemical Geology*, **289**, 31-38