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Isotope ratio anomalies of dissolved Mo and W caused by hydrothermal activities around subduction zones, the Izu Ogasawara Arc and the Okinawa Trough

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Molybdenum (Mo) and tungsten (W) are redox-sensitive elements and prospective proxies for paleoceanography. Recently we have discovered that the isotope ratios of Mo and W are uniformly distributed in the open ocean as well as concentrations of Mo and W [1]. In addition, we found that W shows anomalies with high-concentration and low-isotope ratio in river and coastal seawater near a metropolitan area due to anthropogenic pollution and that the anomalies extend over marginal seas. Hydrothermal activities in the ocean are important source and/or sink for many elements. The concentration of Mo becomes high in low-temperature hydrothermal fluid but becomes low in high-temperature hydrothermal fluid due to sulfides [2]. In contrast, the concentration of W becomes high in several orders of magnitude in high-temperature hydrothermal fluid, particularly around subduction zones [3]. However, behavior of isotopes of Mo and W in hydrothermal fluid is almost unknown. In this study, we have tuned our analytical method and analyzed samples of hydrothermal fluid and hydrothermal plumes that were collected from hydrothermal areas in the Izu Ogasawara Arc and the Okinawa Trough. The objective of this presentation is to give the first report of isotopic data of Mo and W for hydrothermal activities around subduction zones.

In the Izu Ogasawara Arc, the Pacific Plate subducts beneath the Philippine Sea Plate, and dacite is predominantly distributed. We obtained 4 hydrothermal fluid samples and 8 seawater samples from the Myo in knoll. In the Okinawa Trough, the Philippine Sea Plate subducts beneath the Eurasian Plate, and terrigenous sediment is predominantly distributed above dacite. We obtained approximately 40 hydrothermal fluid samples from some hydrothermal vents in the Okinawa Trough. Generally, the concentrations of Mo and W were higher in samples from the Okinawa Trough. There were negative correlations between concentrations and isotope ratios of Mo and W.

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