Tellurium isotope analysis for the surface layer of the ferromanganese crusts from two seamounts in Northwest Pacific

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Marine ferromanganese crusts (Fe-Mn crusts) are the Fe-Mn oxides widely distributed on the seamounts, and important materials for (pale)oceanographic studies [1]. Tellurium (Te) is one of the highly enriched elements in the Fe-Mn crusts by more than ten thousand times relative to the continental crusts [2]. Variation in concentration and isotopic compositions of Te in the Fe-Mn crusts could be a potential indicator for changes in redox condition of seawater, because of two valences of Te (+4 and +6) in the ocean environments [3].

Fe-Mn crusts were sampled by Remotely Operated Vehicle (ROV) from two seamounts located in the Northwest Pacific, Takuyo-Daigo and Takuyo-Daisan Seamounts, which show different depth profile of the concentration of the dissolved oxygen (DO) in seawater. We focused on the surface layer of the Fe-Mn crusts to investigate the relationship with the ambient seawater and measured concentrations and isotopic compositions of Te. The results were compared with the DO pfofile of seawater in the sampling site.

We found the correlation between the Te concentration and isotopic compositions in surface samples depending on the water depths. With increasing depths the Te concentration decreases more drastically at shallower water depths than at deeper water depths. Two seamounts show a difference in the water depths where the concentration gradient of Te changes. Moreover, changes in isotopic fractionation were also observed at similar water depths. These changes may correspond to the changes in the chemical state of the Mn in conjunction with the changes in the DO in ambient seawater. Therefore, the Te concentration and isotopic compositions in the Fe-Mn crusts may indicate a potential change of the DO in the marine environments.

[1] Hein *et al*. (2014) *Treat. Geochem.* **13**, 273-291. [2] Hein *et al*. (2010) *Oceanography,* **23(1)**, 184-189. [3] Lee & Edmond (1985) *Nature.* **313**, 782-785.