

SVC049-P04

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Geochemical studies of a marine-shallow water hydrothermal system in Kueishantao, Taiwan.

Shogo Oshima^{1*}, Jun-ichiro Ishibashi¹, Takashi Hagiwara², Ayumu Yamada², Jing Zhang²

¹School of Science, Kyushu Univ., ²Faculty of Science, Toyama Univ.

Kueishantao Is. is a volcanic island located about 10-kilometers off NE Taiwan, which is considered as located at the western end of the Ryukyu volcanic arc. The last major eruption of the volcano occurred about 7000 years ago, which formed andesite lava flow and pyroclastics (Chen et al., 2001). More than 30 submarine hydrothermal vents are located at the seafloor of 10 - 30 m water depth along the coast line. Temperature of the vent fluids was as high as 116 °C and the pH is as low as 1.52 (Chen et al., 2005).

With a view to evaluate influence of fluid discharge into the coastal region, we will discuss sources and its contribution to the hydrothermal fluid of Kueishantao. We conducted collaborative studies with National Sun Yat-Sen University in August, 2010. Three fluid samples were collected from hydrothermal vents by scuba diving, and five seawater samples were collected by Niskin bottle from water column above the vent field. Chemical analysis of major elements composition was analyzed by conventional methods using ICP-AES, AAS and IC.

When analytical results are plotted in a two composition diagram, the plots of the obtained samples are aligned along a single line, which is interpreted as a mixing line between two endmembers. The hydrothermal endmember shows lower concentrations in most species than the other endmember which corresponds to the ambient seawater. Based on this signature, the hydrothermal component could be attributed as 1) a hydrothermal fluid that experienced water-rock interactions, 2) a vapor phase of the phase separated seawater, or 3) contribution of terrestrial water.

In the case 1), fluid chemistry should reflect results of the water-rock interaction where Mg is removed from the fluid and cations are leached into the fluid. However, the obtained samples showed low concentrations of all the cations including Rb that is a kind of mobile element. In the case 2), concentration ratios among major cation and anion should be close to those of seawater. However, the obtained samples showed rather diverse Na/Cl ratios, which ranges from 0.86 to 0.79. In order to discuss the possibility of the case 3), chemical composition of lake water collected from Lake xxxxx were plotted together for comparison. It is obvious that the plots of the obtained samples in our study are aligned along the mixing line between the lake water and seawater for major cations (Na, K, Mg, Ca). On the other hand, for major anions (Cl, SO₄), the obtained samples showed enrichment compared with the mixing line. Strong acidity of the obtained samples suggests involvement of magmatic volatiles into the hydrothermal fluid composition, which well explains also the anion enrichment. We are planning to conduct isotope analyses to obtain more strong evidence.

Chen et al., (2001) A date for volcanic-eruption inferred from a siltstone xenolith. *Quaternary Science Reviews*, 20, 869-873.

Chen et al., (2005) Tide-influenced acidic hydrothermal system offshore NE Taiwan. *Chemical Geology*, 224, 69-81.

Keywords: shallow water hydrothermal system, Kueishantao