Hydrothermal circulation within modern sediment layer in a shallow submarine volcano, Wakamiko crater, south Kyushu, Japan

Toshiro Yamanaka[1]; Junichiro Ishibashi[2]; Mariko Segichi[3]; T.Toru Yamashita[4]; Miwako Nakashima[3]; Nobutaka Shimada[2]; Minoru Kusakabe[5]; Hiroshi Miyake[6]; Yohey Suzuki[7]

[1] SCS, Kyushu Univ.; [2] Earth and Planetary Sci., Kyushu Univ; [3] Earth and Planetary Sci., Graduate School of Sci., Kyushu Univ.; [4] Earth and Planetary Sci., School of Sci., Kyushu Univ.; [5] ISEI, Okayama Univ.; [6] Enoshima Aqua.; [7] SUGAR, JAMSTEC

A vigorous fumarolic activitie has been occured on a seafloor in the submarine Wakamiko volcano, which is considered one of the craters of the Aira caldera and the Sakurajima volcano is also another crater cone located on land. Previous studies of the Wakamiko volcano strongly indicated that a high-temperature (over 300 degree C) hydrothermal activity was once occurred, because the occurence of some hydrothermal-origin authigenic minerals and hydrothermal petroleum were recognized in the surface sediments of this area. Although several dive studies using the manned and unmanned submersibles were done in this area for the last decade, only passive hydrothermal-fluid shimmering has been observed in a small area until today. The fluid shimmering was found at a small mound about one meter in height and three meters in diameter and some fumaroles were located near the mound. Temperature of the mound measured by stabbing a temperature probe (20cm length) was up to 150 degree C. Then we collected some core samples of the mound and measured the interstitial water in the core sediments. As a result of analyses of the interstitial water, the estimated temperature from the silica concentration (approx. 5mM) of the estimated end-member fluid at the seafloor pressure (approx. 200m in depth) was almost identical with the measured value of the mound surface, it suggests that dissolved silica in the fluid reach in equilibrium with quartz beneath the seafloor. Chemistry of the interstitial waters was almost same with that of the shimmering water obtained just above the seafloor and was closer to the estimated end-member fluid. It means that the hydrothermal fluid reach to seafloor and discharge from the mound. Characteristics of the fluid chemistry were as follows. 1) Significant lower chloride concentration than that of seawater, and adding dissolved silica, ammonium and hydrogen sulfide, 2) the interstitial waters were depleted in deuterium and rich in 18O rather than seawater, especially delta D values were negative. These characteristics imply that meteoric water and/or magmatic water interacted with rock were contributed to the fluid chemistry. Similar venting fluids have been reported from the shallow submarine hydrothermal systems associated with island-arc volcanisms, where some elements rich in magmatic volatiles such as mercury, antimony, and arsenic are absorbed into the fluids and mineralized at the vents. In fact, stibnite and realgar were detected in the mound sediments, in addition, high mercury content of the bottom sediments were previously reported in the crater. To clarify the scale of hydrothermal activity at the crater and magmatic volatile input it is required to further analysis of the hydrothermal fluid and fumarolic gas chemistries. In addition, for forecast volcanic activity of the caldera it is recommended long-term monitoring of the chemistries.