

Geochemistry of Low Temperature Hydrothermal Activities at the Kaikata Seamounts, Izu-Bonin Arc

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During "Shinkai 2000" dive studies conducted in Nov. 2000, two kinds of hydrothermal fluid samples were collected. One was discharging from a dyke structure which surfaces were completely covered with iron hydroxide precipitates (Akaiwano-yu). The other was from the walls of craters in the central cone (Shiroiwano-yu). Akaiwano-yu had the maximum temperature of 33C, whereas Shiroiwano-yu had a temperature of 10-18C. Both fluids, because of sulfuric acid, show of extreme low pH. Therefore, the fluids have a characteristic of high concentrations of metal elements, regardless of relatively low temperatures. The fluids have another characteristic: chemical compositions of Shiroiwano-yu are not simply explained by the dilution of Akaiwano-yu.

The Kaikata Seamount is one of submarine volcanoes in Izu-Bonin (Ogasawara) Arc. During "Shinkai 2000" dive studies conducted in Nov. 2000, two kinds of hydrothermal fluid samples were collected at the Kaikata Seamount. One was discharging from a dyke structure which surfaces were completely covered with iron hydroxide precipitates (Akaiwano-yu). The other was from the walls of craters in the central cone (Shiroiwano-yu). Akaiwano-yu had the maximum temperature of 33C, whereas Shiroiwano-yu had temperatures of 10-18C. Both fluids, because of sulfuric acid, show of extreme low pH (~5.6). Therefore, the fluids have a characteristic of high concentrations of metal elements, regardless of relatively low temperatures. In Akaiwano-yu, the concentrations of metal elements are nearly coincident with the solubilities calculated from temperature and pH. The fluids have another characteristic: chemical compositions of Shiroiwano-yu are not simply explained by mixing of Akaiwano-yu with ambient seawater. In fact, Akaiwano-yu shows higher concentration of sulfide ion than Shiroiwano-yu; some sort of chemical reactions, even at the low temperature, might have caused the situation.

In conclusion, geochemistry of hydrothermal fluids collected from the Kaikata seamount is strongly controlled by contribution of magmatic volatiles.