

Hydrothermal alteration of andesite from the Hatoma Knoll in the southern Okinawa Trough at 325 C, 300 bars: Comparison of chemical composition of hydrothermal fluid in the laboratory experiment and in the natural system

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The formation of seafloor massive sulfide deposits is closely related to the chemical compositions of (sub)seafloor hydrothermal fluid. Water-rock interaction between hydrothermal fluid and intermediate to felsic rocks is a dominant process that controls the fluid compositions in the arc and back-arc hydrothermal systems, although the process has not been experimentally examined yet in detail. Therefore, we reacted the NaCl solution with an andesite collected from the Hatoma Knoll field in the southern Okinawa Trough during the KY14-02 Cruise by R/V Kaiyo under high-pressure and -temperature conditions. The results show that the concentrations of selected elements (e.g., K, Si, and Ca) in the reacted fluid obtained by the experiment are inconsistent with those of the previously reported hydrothermal fluids from the Hatoma Knoll whereas the pH value in the reacted fluid is similar to the observed value in the hydrothermal field. The discrepancies in the fluid composition between the laboratory experiment and the Hatoma Knoll field suggest that the reaction zone of the field is not only composed of andesite.

Keywords: the Hatoma Knoll hydrothermal field, andesite, Hydrothermal alteration