

Investigation of the hydrothermal circulation occurred in the unconsolidated sediment filled in the Wakamiko crater, Kagoshima Bay

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At least three active volcanoes are located in and around Kagoshima Bay, South Kyushu, Japan. The bay has been considered a tectonic graben formed under extensional stress associated with subduction of the Philippine-sea plate sinking below the Eurasia plate and the axis of graben is extended along the volcanic front. In addition, the bay head area is a part of the Aira caldera, it is considered to form ca. 25,000 years ago. The Wakamiko crater is an active crater of the caldera and the depression figure of crater is buried by a thick (up to 80m) unconsolidated deposits. Therefore, the crater floor shows quite flat feature and the depth of floor is ca. 200m. In the crater hydrothermal activity has been recognized, however, active vent of hydrothermal fluid is not found except two gentle shimmering from fissure and small collapse developed on muddy floor.

During the dive study of ROV/Hyper-Dolphin of JAMSTEC (R/V Natsushima, NT07-09 Cruise) in June 2007, active hydrothermal venting ($T = 199$ degC) was found on the crater floor, and the venting as ca. 10-cm-wide jet of hot water without gas was observed atop of mineralized chimney-like structure at least 1.5 m in height. In addition, another active venting was found by the AUV/Tuna-Sand dive during R/V Taisei-maru cruise. Fluid samples venting from the both chimneys were successfully collected and were provided for geochemical analyses.

Chemistry of the venting fluid was almost comparable with one of the shimmering fluids obtained as pore water, which was characterized by low salinity ($Cl = 300$ mM) and higher K concentration than seawater. Alkalinity and ammonium ion concentration were also quite high, those values were almost comparable with those of the hydrothermal fluids of Guaymas Basin, where a typical sediment-hosted hydrothermal system. The low salinity can be caused by mixing with meteoric water, it contributes to the unique fluid chemistry. The estimated fluid temperature in equilibrium with the surrounding minerals is ranging from 230 to 250 degC calculated using various geothermometers. So, the fluid is expected cooling until reaching at seafloor.

In this presentation, we will discuss the plausible process of hydrothermal circulation occurred within the unconsolidated sediment based on the fluid chemistry and the previous findings associated with the volcanic activity at the crater.