# Characteristics of an hydrothermal fluid pool developed just beneath the seafloor of the Suiyo hydrothermal system

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Dense and active hydrothermal venting has been occurred at the centeral part of the caldera floor on the Suiyo seamount, several isolated hydrothermal vents were found along the east edge of the caldera floor. Development of a hydrothermal fluid pool beneath the vent was inferred at one of the isolated vents by the observation of that ridge-like sharp from the submersible. From the vent site fluids, deposits, and biological samples were recovered and some of them have been analyzed. This study forms part of 'Archaean Park Project'.

The hydrothermal vent site form a ridge of about 10m length, 2m width, and 0.5m height, and hot fluid (max 180 degree C) is venting from the center of ridge. A dense deep-sea mussel colony was developed on a putative dead chimney at a terminal of the ridge, and at the other terminal fluid shimmering from a small crack was observed. Temperature of the shimmering fluid at the sea floor was about 20 degree C, whereas the tip of the fluid sampler could be installed about 10cm penetrate through the crack and sampled 135 degree C fluid. The fluid temperature was very stable during sampling, it imply that the fluid was pooled beneath the seafloor.

The ridge seem to form with sulfate pavement and not sulfide mound, therefore, sulfate dome may be developed beneath the seafloor by previous active venting. From the observation of the fluid temperature dropping the volume of fluid pool was estimated about ten and a few litters.

Chemistry of the venting fluid can be plotted on the mixing line of the estimated end-member fluid of Suiyo hydrothermal system and ambient seawater. On the other hand, the pool fluid was depleted in H2S, Fe, and methane with only small depletion of Si. It suggests that precipitation of iron sulfide and oxidation of H2S and methane are occurred in the pool. Sulfur isotopic composition of H2S in the pool fluid was approx. 1 per mil higher than that for the end-member fluid, while d34S value of sulfate in the pool fluid was approx. 0.5 per mil lower than that for ambient seawater. That depletion of d34S value of sulfate is good agreement with estimation of the sulfate input from H2S oxidation. This site was located just north of the eastern hydrothermal area, where 34S-depleted sulfate minerals was actually occurred (Kakegawa et al., 2002). Although microbiological study of the fluids has been underway, H2S oxidation may be occurred by abiotic, however, methane oxidation should be biological.

Although temperature of the pool fluid was lower than that of the venting fluid, the pool fluid was considered cool down without mixing with ambient seawater. Simiar fluid pool should develop beneath the central vent site. Such pool may act as a incubator for microbes. Temperature of the pool was lower than 150 degree C, it may be possible range for microbial activity. Similar fluid pool developed beneath the seafloor has not known previously. This is an important case study to know the fluid chemistry of hydrothermal fluid reservoir, because that kind of sample could not be recovered by the drilling system.

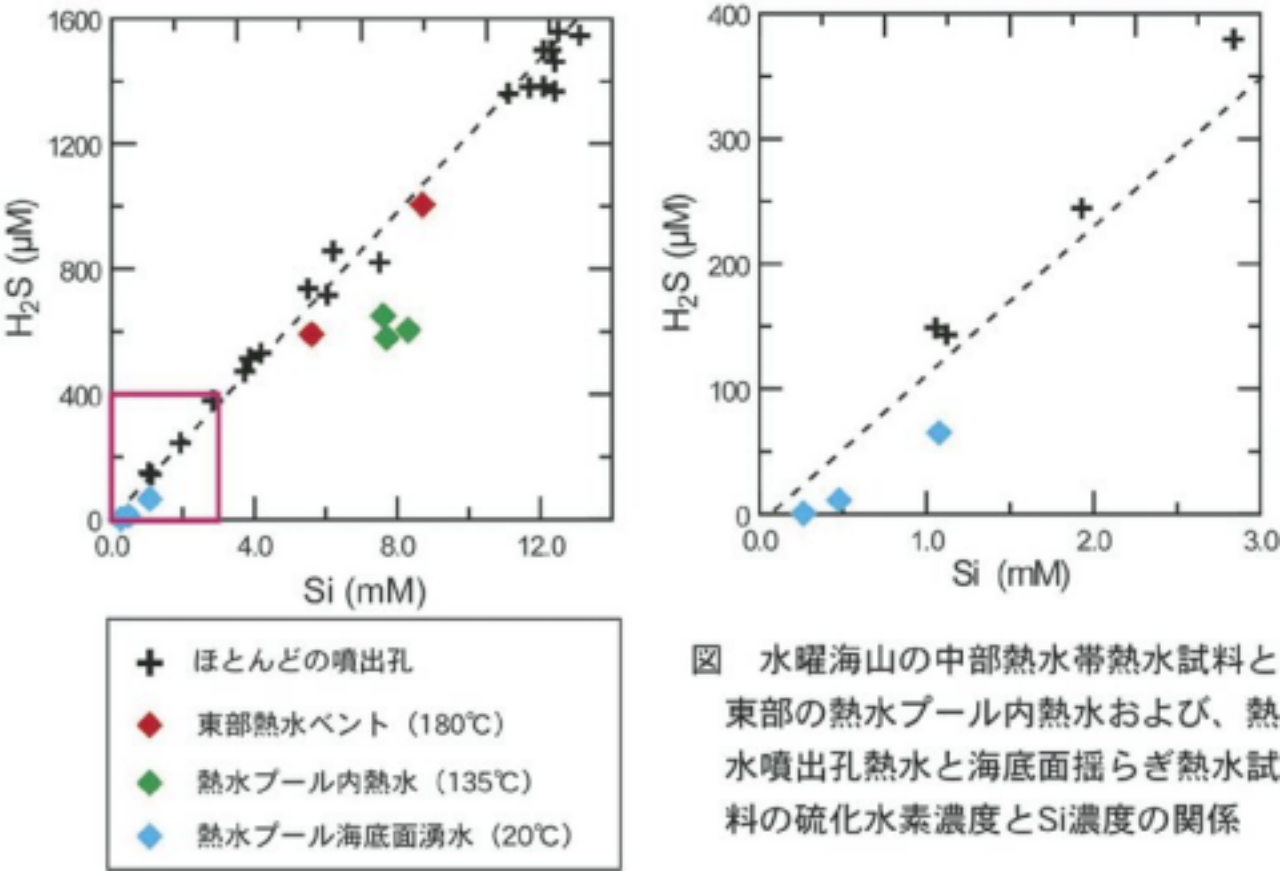


図　水曜海山の中部熱水帯熱水試料と東部の熱水プール内熱水および、熱水噴出孔熱水と海底面揺らぎ熱水試料の硫化水素濃度とSi濃度の関係