

## Monitoring of chemical environment of hydrothermal area:Development of a periodical sampling device

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We developed a new sampling device named 'N1' which collects diffuse flow periodically for a few days for the purpose of monitoring chemical environment of hydrothermal area. N1 is composed of two peristaltic pumps (suction rate is ca. 0.7 ml/min.), a 250-m length of 1-mm I.D. Teflon tubing for sample storage filled with distilled water beforehand, a flexible bag filled with red-colored silicon oil, a controller and 8 alkaline manganese batteries. These parts are aligned in a frame of 40 x 30 x 30 cm, and whole weight is 28 kg in air and 20 kg in water. To collect a series of samples at one deployment, sampling volume of N1 is designed as 0.5 ml to a few ml. At programmed time, the pump starts introducing fluid sample through the inlet into the Teflon tubing replacing distilled water. Then, the other pump injects red-colored silicon oil for separation of the sample. An approximate time required for sampling 1.0 ml fluid and waiting for telescopic motion of tubing is 30 minutes. Sampling interval and sampling duration can be programmed.

N1 was deployed at the Suiyo hydrothermal field (depth = 1370 m) which is located at the caldera floor of Suiyo seamount in Izu-Bonin arc, during the ROV Hakuyo2000 dive program in August 2002. 30 fluid samples of 1.0 ml were successfully collected by N1, every 30 minutes for 20 hours. We analyzed silica, manganese and magnesium concentrations of obtained fluid. Silica, manganese and magnesium concentration fluctuated respectively with time. Fluctuation of silica concentration showed good correlation with that of manganese. Depletion in magnesium concentration is correlated with high silica and manganese concentrations. Ratio of Si/Mn is nearly equal to that of the high temperature fluid. These correlations indicate that chemical fluctuations are caused by variation of mixing of hydrothermal fluid and ambient seawater. Temperature data from the CTD sensors located 3 m apart from N1 fluctuated similarly to the chemical components observed by N1. Fluctuation of chemical environment seems to occur in rather wide region over a few meters. Comparison of ambient current, ocean tide and earth tide with the chemical fluctuation showed relationship between fluctuation of absolute value of ambient current velocity and that of chemical environment. In conclusion, time series fluctuation detected by N1 suggest that chemical environment of hydrothermal area is effected by ambient current.