

Local hydrothermal circulation observed within the caldera of Suiyo Seamount, Izu-Bonin Arc

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Suiyo Seamount (28-34'N 140-38'E) is one of the Seamounts on the Shichiyo Seamount chain. The hydrothermal activity area is located on the floor of the caldera, and its size is about 300m from north to south and 100m from east and west. To estimate the heat structure of hydrothermal area, 52 heat flow data are obtained using stand alone heat flow (SAHF). And the existence of the fine hydrothermal circulation system has been identified, 317 degrees celsius at maximum temperatures and 127 W/m² at maximum heat flow data. The heat flow value is the highest at the center of the hydrothermal area and the area of the low value also exists around it. As the results of the observations, it is clear that the heat flow data are varying over 3 orders of magnitude, and the effect of the local hydrothermal circulation is inferred.

The NT05-16cruise was carried out using R/V NATSUSHIMA and ROV 'Hyper Dolophin' from September 22nd to October 7th 2005. We conducted 4 dives at the hydrothermal area in the caldera of Suiyo Seamount. We obtained 10 heat flow. 8 measurements were made within 5m of an isolated hydrothermal vent, located 20m north of the center of Suiyo hydrothermal field. 4 measurements were aligned eastward and the other 4 were aligned northward, both separated 0.5-1m each. The eastward transect indicates that sub-bottom temperature at 50cm below seafloor decreases from about 60 degC at 50cm apart from the vent to no temperature rise at ~4m from the vent. Furthermore the temperature vs. depth profiles for the eastward 4 data are concave. It strongly suggests that the local recharge of sea water into the hydrothermal reservoir takes place in this area, with estimated darcian velocity of 1E-6 m/s. Such a local circulation has been observed in other hydrothermal area, such as Okinawa Trough, or TAG hydrothermal field of the Mid-Atlantic Ridge.