

Temporal Variation of Hydrothermal Activity within the Caldera of Suiyo Seamount, and Estimate of Heat Loss

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We have obtained time-series measurements of diffuse hydrothermal effluent temperatures and velocities at the Suiyo Seamount on the volcanic front of the Izu-Bonin (Ogasawara) Arc, western Pacific, using Medusas series, a deep-sea fluid monitoring system. In August 2002, we deployed two Mini-Medusa at areas of warm diffusive flow and two Medusa/Gemini on top of cased seafloor boreholes for about two weeks. All data shows strong correlation between fluid temperatures and seawater temperatures. Four systems are located at distances of several tens of meters; however, synchronized temperature fluctuations are frequently observed. The fluid velocities show strong positive correlation with those of temperatures in cases of Geminis on top of cased seafloor boreholes. It suggests that the fluid is driven by buoyancy through the cased seafloor borehole. However, they show negative correlation in cases of Geminis on diffusive flow areas. The most prominent feature of all data is the strong semi-diurnal oscillation.

Recent studies showed that diffuse heat flow in the ratio of 10:1 with axial high-temperature flow at ridge-related hydrothermal system [e.g., Schultz et al. (1992)]. However, there is no information about the ratio on island-arc hydrothermal system. In 2001-2002, hydrothermal activity within the caldera of Suiyo Seamount was investigated in detail. By combining direct measurements of the temperatures and flow rates of diffuse and low-temperature effluent flow with heat flow distributions, and by considering also the high-temperature flow, most of the total hydrothermal heat flux might be to be expressed in the form of high-temperature flow.