

A month-long observation of high and low temperature vents at the Suiyo Seamount hydrothermal site

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Following the BMS drilling operations by R/V Hakurei-maru No. 2 at a hydrothermal site in the summit caldera of the Suiyo Seamount in June 2001 (Urabe et al., this meeting), we conducted seafloor observatory works by two successive cruises, i.e., an ROV Hakuyo 2000 cruise supported by M/V Shinsei-maru from July 28 to August 11, 2001 and a manned-submersible, Shinkai 2000 cruise supported by R/V Natsushima from August 23 to September 18, 2001. Among many observatory instruments deployed on the seafloor, here we report the results by the chemistry stations and CTD station.

Instrument summary: No. 1 and No. 2 chemistry station monitored temperature and redox in a flow tube from vents at the interval of 2 minutes and ambient temperature outside of the flow tube at the interval of 30 seconds. In addition to the sensors above, No. 3 chemistry station monitored pH in the flow tube. CTD station consisted of Idronaut Ocean Seven 316 CTD with redox, pH, optical back scatter (OBS) and DO sensors and independent Digiquartz precision pressure sensor and recorder.

Station summary: No. 1 chemistry station was deployed on a ca. 50 cm high mollusc and bacteria complex mound about 5 m apart from the drill site, APSK04 on August 5. It was unfortunately kicked off from the mound by the submersible, Shinkai 2000 at 12:19 of August 27. No. 2 chemistry station was deployed on a black smoker vent about 10 m north of the drill site, APSK06 on August 5. It is supposed to fell down on the seafloor at 10:13 of August 24 by strong bottom current. No. 3 chemistry station was deployed on a black smoker vent very close to the drill site, APSK05 on August 10. The recorder was unfortunately damaged and no data was recovered. CTD station was deployed on the sandy seafloor about 20 m apart from the APSK04 drill site on August 9. It was recovered on September 15.

Observatory results: Neither the temperature records from Aug. 5 to 24 in hot water natural vent (292 to 298 deg C at No. 2 chemistry station) nor those in warm water natural vent (7 to 23 deg C No. 1 chemistry station) did not show apparent tidal component. The temperature of the hot water gradually rose up from 294 to 297 deg C towards middle of Aug. 14 and then stayed around 296 deg C during the rest of the days except for the short temperature drops. On the other hands, the temperature of the warm water vent rose up from 7 to 15 deg C fluctuation to 12 to 23 deg C fluctuation on Aug. 14. Short temperature drops in the hot water natural vent well correlated with short temperature rise in warm water natural vent. This phenomena suggested the existence of short flow regime change in the hydrothermal system. Fell-down event of No. 2 chemistry station at 10:13 of August 24 was well correlated with the sharp drop of the temperature at CTD station, which suggest that the strong bottom current introducing relatively cold water to the hydrothermal site might be the cause of the event. Because many temperature drops recorded on the CTD station were preceded by temperature rises, the strong bottom current may have been introduced by thermal instability in the water near the seafloor in the hydrothermal field. The temperature record at CTD station shows strong tidal component. It is either suggesting tidally induced bottom current change or tidally induced hydrothermal activity change.

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