

The pH Mapping and Water Current in the Suiyo Seamount Caldera.

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Deep-sea hydrothermal systems play an important role as a significant source and/or sink of chemicals in the ocean. The mapping and long-term monitoring of the chemical parameters in hydrothermal plumes using in-situ chemical sensors are the most efficient methods for trying to understand hydrothermal discharge. The variation of hydrothermal activity was greatly controlled in the tide, and not only geochemical observation but also physical observation of water current measurement, etc. were required to understand the hydrothermal systems. In order to observe the diffusion hydrothermal plumes, mapping and long-term monitoring of pH using the in-situ pH sensor and measurement of water current were carried out in the Suiyo Seamount Caldera.

The three-dimensional acoustic current meters were moored at the height of 13m and 125m above the bottom in the Suiyo Seamount Caldera. At the 13m height, average water current speed and current direction were 10.46 cm/second and 228.1 degrees, respectively and maximum water current speed was over 40.46 cm/second. At the 125m height, average water current speed and current direction were 3.87 cm/second and 57.8 degrees, respectively. The strong water current of the southwest direction in 24 hours periods existed near bottom of the caldera and the water current at mid depth of the caldera was northeast direction that is opposite direction to the bottom current.

The in-situ pH sensor employs an Ion Sensitive Field Effect Transistor (ISFET) as a pH electrode, and the Cl ion selective electrode (Cl-ISE) as a reference electrode. The ISFET is a semiconductor that can measure ion concentration in aqueous phase and has a quick response (within a few second), high accuracy (+0.005pH,-0.005pH) and pressure-resistant performance. The pH sensor was attached to the SHINKAI 2000 and the pH change was monitoring during sampling and observing at the hydrothermally active areas. Sharp pH anomalies associated with light transmission anomalies were observed during the dives. The figure of pH mapping in the Suiyo Seamount Caldera was produced from the results of the five dives. During long-term monitoring of pH at the hydrothermally active area in the caldera, 0.3-0.4pH decrease in 24 hours periods was detected.