

Biodiversity of deep-sea hydrothermal vent fauna and its relationships to environments in Okinawa Trough

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Flourish assemblages of deep-sea hydrothermal vent fauna associated with steep environmental gradient formed by high temperature venting fluid containing high concentration of metals and the other kinds of chemicals. The Okinawa Trough, is a backarc basin which has started rifting from the southern part 2My ago, and at least nine hydrothermal vent fields has been discovered along the NE-SW spreading axis. Multi-disciplinary investigation was carried out in five of nine vent fields to find out the relationships between biodiversity and environments in the Okinawa Trough.

In the five hydrothermal vent fields, quantitative faunal sampling and simultaneous environmental measurements using sensors including a newly developed D-Pote (a Deep-sea Potentiostat) were carried out at more than two points in each vent field, during the NT11-20 cruise of R/V Natsushima / ROV Hyper-Dolphin. Biodiversity was evaluated based on the collected faunal samples and the relationships between faunal composition and environmental factors such as temperature, depth, salinity, and concentrations of oxygen and sulphide compounds were examined statistically.

Biodiversity of the vent fauna was relatively low in the northern part of the Okinawa Trough, where vent fields are located in relatively shallow area (< 1000 m depth). On the other hand, in the southern, relatively deep (> 1000 m depth) and older part, vent communities of relatively high biodiversity corresponding with great variation of concentration of sulphide compounds were observed. The present results suggested that the correspondence of the biodiversity, environmental diversity, and geological history of hydrothermal vent fields in the Okinawa Trough.

Keywords: hydrothermal vent, biodiversity, similarity, chemosynthetic community