Seafloor hydrothermal activity at off-axial seamounts of backarc spreading in southern Mariana Trough

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Extensive occurrences of massive sulfide and sulfate deposits associated with active high temperature fluid venting were located at two off-axial seamounts of backarc spreading in the southern Mariana Trough. During the dive programs TN167A cruise in March 2004 using ROV ROPOS (CSSF) and R/V *Thomas G. Thompson*, and YK05-09 cruise in July to August 2005 using submersible SHINKAI6500 (JAMSTEC) and R/V *Yokosuka*, both mineral and fluid samples were collected from these two sites.

The Archaean site (12°56.35'N, 143°38.0'E, depth = 2990m) is located at the ridge flank, about 2km apart from the backarc-spreading axis. The hydrothermal field has several discrete hydrothermal mounds with active and/or inactive chimneys, one of them being as high as 50m. Chemistry of the discharging fluids (Tmax = 343°C) was characterized as low pH (pH = 3.0 at room temp. measurement) and low Cl concentration (Cl = 420mM). The Pika site (12°55.1'N, 143°38.9'E, depth = 2830m) is located around the top of an off-axial seamount about 350m high, which is about 5km away from the backarc-spreading axis. Large sulfide mound about 30m high has several fluid ventings with a maximum temperature of 330°C. Fluid chemistry showed brine-rich signature (Cl = 600mM) and is characterized as low pH (pH = 3.0 at room temp. measurement) and high metal concentration (Fe = 7.0mM).

Mineralogy of sulfide samples showed similarity in these two sites. Active chimney structures were composed of abundant pyrite/marcasite with common chalcopyrite and sphalerite, while inactive chimneys and mound sulfides contain late barite infilling conduits and interstices of those sulfide minerals. However, isotopic composition of sulfides were clearly different; delta-34 S values were from +3.6 to +4.3 ‰ in Archean site and from +0.8 to +3.0 ‰ in Pika site. This difference may reflect change of tectonic setting in off-axis seamounts.