

Subseafloor mixing between the hydrothermal fluid and seawater at the Ieyama Hydrothermal Field, Mid-Okinawa Trough, based on mineralogy and geochemistry of clay minerals and sulfate minerals.

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Ieyama hydrothermal field is located at the seafloor around a water depth of 1050-1100 mbsl (meters below the sea level) in the mid-Okinawa Trough. Scientific drilling performed by J-MARES during JM18-04 Cruise in September 2018 confirmed sulfide and sulfate mineralization in the layer from 50 to 65 mbsf (meters below the seafloor) of the sediment core collected from a bottom of circular depression of about 100 m diameter (Ishibashi et al., JpGU 2021 meeting). In this study, we conducted identification of clay minerals by XRD (x-ray diffraction) after elutriation and chemical analysis of the clay minerals using EPMA (electron probe micro analyzer) by Cu-EPMA method (Miyoshi et al., 2017).

Occurrence of clay minerals is characterized as zonal distribution in 4 layers. From the top to bottom, layer of smectite (47.4-51.0 mbsf), layer of illite/smectite mixed layer mineral (51.8-54.1 mbsf), layer of illite (54.7-58.1 mbsf), and layer of illite and chlorite (60.0-70.0 mbsf). Considering formation temperature condition of each clay mineral, steep temperature gradient is suggested. Occurrence of Mg-rich chlorite suggests substantial penetration of seawater component at the depth around 60.0 mbsf. The mineralogy of clay minerals basically agrees with the model of subseafloor mixing between the hydrothermal fluid and seawater based on the previous study focused on sulfate minerals (Itatani et al., JpGU2021).

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