

Sub-seafloor structure of hydrothermal deposits in Hakurei site, Izena Hole, the Mid-Okinawa Trough by VCS survey

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Seafloor hydrothermal deposits are formed in the deep sea around hydrothermal venting sites, where abundant metals precipitate. The seafloor locations of hydrothermal deposits are revealed by the exploration of geophysical, geochemical and submersible investigations. Hydrothermal deposits are known to form chimneys or mounds. Scale of hydrothermal mound is thought to be a hundred meters square by recent surveys. The sub-seafloor distribution of hydrothermal deposits are identified partially by drilling core data, however, a continuous structure has not been fully understood yet. To improve the quality of the sub-seafloor imaging of hydrothermal deposits, high-resolution geophysical data acquisition is required. We conducted two Vertical Cable Seismic (VCS) surveys at Hakurei site, Izena Hole in the Mid-Okinawa Trough to reveal sub-seafloor structure of hydrothermal deposits. In September 2011, we carried out 28 survey lines around the hydrothermal mound in the Hakurei site using an air-gun source during KY11-E04 cruise. In August 2013, we carried out 28 survey lines around the southern part of KY11E-04 survey area in the Hakurei site using a sparker source during KY13-E02 cruise. VCS surveys successfully imaged the shallow sub-seafloor structures of the hydrothermal field. We identified a mound shape reflector at the sub-seafloor. In addition, we estimated the seismic velocity at the sub-seafloor by the common reflection point (CRP) gathers. Some of the reflectors of the CRP gather show high velocity zone at the sub-seafloor. Previous drilling survey reported that hydrothermal deposits are buried by volcanic sediment in the Hakurei site. These results suggested that high velocity zone between reflectors at sub-seafloor is sediment-buried hydrothermal deposit.

Keywords: Hydrothermal deposits, VCS survey, Mid-Okinawa Trough, Sub-seafloor structure