



Authigenic carbonate formation and spatial venting phenomena on the active venting area of the passive continental margin offshore Southwestern Taiwan

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Rapid sulfate reduction, high dissolved sulfide and methane contents were found in sediments of the northeastern South China Sea. In order to understand relationship between gas venting and biological community, we investigate sea floor vent features using WHOI's TowCam system as well as box and piston cores in the study region. A total of 3 dives and 12 coring sites were conducted on board the r/v Ocean Research-1. Pore water sulfate, dissolved sulfide, methane, chloride, sediment organic carbon, carbonate content and carbonate $\delta^{13}C$ and $\delta^{18}O$ ratio, pyrite-S were measured. Large spatial variations were found based on pictures obtained from TowCam system and core samples. Active venting features include gas plume, bacterial mats, live mussel patches, bleached white-colored crabs, spider crabs, and rapid sulfate reduction and high concentrations of methane in sediments. In addition, various sizes of authigenic carbonate were also observed in the active venting area. Authigenic carbonate concretions $\delta^{13}C$ ratios were lower than -45 per mil, indicated anaerobic oxidation of methane is a major process in facilitating carbonate formation. In addition, mussel shell $\delta^{13}C$ showed slightly higher $\delta^{13}C$ ratios. Salinity and temperature along the tow tracks also show rapid variations near the vent areas while little fluctuation away from the active vent area. Away from the active vent, dead mussel and bleached shells were abundant in muddy sediments with little or no carbonate formation. Although large sizes of authigenic carbonate crusts and slabs were found near venting area, the area with authigenic carbonate coverage are relatively limited as compare to those found in the active margin near Taiwan.