



Estimation of Methane Flux from Submarine Mud Volcanoes in the Upper Slope Offshore Southwest Taiwan

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Thirteen submarine active mud volcanoes, which named MV1~ MV13 located on the upper slope, have been recognized in the area between Kaoping Canyon and Fangliao Ridge, offshore southwest Taiwan. It is believed that these mud volcanoes are closely related to the intrusion of mud diapir. The major composition of the gas seeps is methane. The gases may escape to the atmosphere and become an important natural source of greenhouse gas.

To estimate the methane flux emission via those mud volcanoes in this area, we have conducted three cruises during the period of 2011-2012. In this study, we traced the location of gas plume for each mud volcano by echo sonar (EK500) survey first. And then, we can collect the water column samples right above the venting mud volcanoes, also sediment samples by gravity cores.

The carbon isotopic data of methane gas from cored sediments range from -30 to -50 ‰. It indicates that the methane gas is mostly thermogenic in origin, and may mix with different proportions of biogenic source. Meanwhile, the dissolved methane concentrations of sea water above the seepages are 2-20 times higher than the background area. The ocean-to-air methane flux, ca. $0.10 \sim 82.3 \text{ umol CH}_4 \text{ m}^{-2} \text{ d}^{-1}$, can be calculated by diffusive exchange equation. Furthermore, we can estimate the flux ca. $2 \sim 174 \text{ kg yr}^{-1}$ for each seepage, and the total flux ca. $11,086 \text{ kg yr}^{-1}$ in this region.