

Isotopic composition and U-Th age of methane derived authigenic carbonates

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Shallow gas hydrates often occur in close association with carbonate concretions. The precipitation of carbonates is considered as the results of sulfate reduction-methane oxidation (AOM) at SMT at around 2 to 5 mbsf in high methane flux fields. Methane derived authigenic carbonates (MDAC) of shallow gas hydrate fields in Japan Sea range in size from a few mm to a few meters. They are mostly composed of high mangesian calcite (HMC) and/or aragonite (AR). Oxygen isotopic signatures seem to indicate that HMC were formed in waters slightly depleted in O-18 while AR were from slightly enriched in O-18, or alternatively, HMC from higher temperature and AR from lower temperature. Frequency and amount of MDAC should reflect the intensity of AOM, that is, the intensity of methane fluxes. Therefore, the secular variation of methane flux in the past can be referred from the age distribution of MDAC. Ages of the precipitation of MDAC were determined by means of the U-Th isotope disequilibrium method. Previous studies (Watanabe and Nakai, 2006; San-no, 2008MS; Suzuki, 2010MS) have revealed that the age of the MDAC collected from surface sediments (< 4 mbsf) tends to concentrate around 20ky, and discussed the relation with glacio-eustasy. MDAC of this study ranges from the sea floor to about 80 mbsf, covering the entire depth range of shallow gas hydrate. Precise age determination of the MDAC should reveal the time constraint and conditions of the formation of shallow gas hydrate of Japan Sea. This study was conducted as a part of the shallow methane hydrate exploration project of METI. We express our thanks for allowing us to present this work.

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Keywords: MDAC methane derived authigenic carbonates, shallow gas hydrates, U-Th isotopic disequilibrium