

STABLE CARBON ISOTOPES AS A POWERFUL INDICATOR OF METHANOGENESIS AND METHANOTROPHY IN ANOXIC BLACK SEA SEDIMENTS

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The ratio of stable carbon isotopes is being used to understand and describe biological transformation of methane in sediment samples obtained during the cruise with the RV Marion Dufresne 2004. Cores No. 2770, 2780, 2782, and 2790 have been studied for methane concentration and for carbon isotopes of methane.

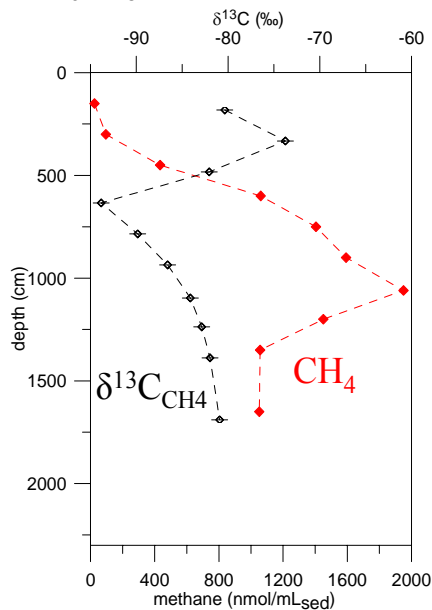
In the sediments we observed significant difference S of $\delta^{13}\text{C}_{\text{CH}_4}$ as a result of methanogenesis and deep methane sources. In several cores methane decreases due to the seawater sulfate dependent anaerobic oxidation of methane (AOM).

It is notable that the content of methane mostly is increasing rapidly at a depth of around 400 cm and 700 cm, respectively. This process of methanogenesis is accompanied by an enrichment of $^{12}\text{C}_{\text{CH}_4}$ which can be interpreted as the fractionation of archaea favouring the lighter carbon isotope.

Profiles of cores at the deeper slope approve this assumption, while others seem to be not related to this pattern (eg. 2770, 2790). A steady isotope signature leads to the assumption that no biological processes are involved in the increase or decrease of methane concentration, but are more likely a result of lateral transport of methane from cold seeps. First analysis of organic compounds of higher molecular weight have been performed.

“regular deep sea area“

MD 04-2782



MD 04-2782 (1009 m)

