Distribution of methanogenic coenzyme F430 in the subsurface water columns at north Pacific Ocean

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Estimated annual methane emission is 500-600 Tg, in which 70% of methane is produced by methanogens (obligatory anaerobic archaea). Contribution from ocean (oceanic methane) into atmospheric methane is relatively small (3%) since most of methane produced in subsurface sediment is consumed in the upper part of sediment and water column. It is suggested that the escaped methane is the origin of the oceanic methane. On the other hand, over saturation of methane in surface seawater have been observed at pelagic ocean. This methane production in the oxic environments is referred to as “Ocean methane paradox”

Some mechanisms of aerobic methane production have been suggested; 1) methanogenesis by methanogens in anaerobic microenvironements [1], 2) decomposition of methyl phosphonate by bacteria, 3) methanogenesis by a consorcia of algae and methanogens [2].

If methanogens contribute to the methanogenesis under aerobic conditions, coenzyme F430 which is key coenzyme of methanogenesis should be detected in the water column [3]. In this study, we investigated distribution of coenzyme F430 in the surface water column (down to 500m) sampled by RV Mirai during MR14-04 cuise at north Pacific Ocean.

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[2] Grossart et al. (2011), *Proc. Natl. Acad. Sci.* USA **108**, 19657-19661.
[3] Kaneko et al. (2014) *Anal. Chem.* **86**, 3633-3638.