巨大地震後の深海底におけるメタン生成ホットスポットの出現
"Hot spot of methanogeneis" on the deep-seafloor after the mega-erathquake

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We investigated the deep-sea microbial ecosystem after the 2011 Off Tohoku Earthquake and tsunami. In the series of study, we found several "hot spot of methanogeneis" on the deep-seafloor after the mega-earthquake and demonstrated the methylotrophic methanegenesis in the deep-sea surface sentiment.
On the 2011 cruise, we found a lot of large microbial mats on the 5,000 m-depth deep-seafloor. The surface sediment cores (< 25 cm) were collected from microbial mats and analyzed their chemical and microbial profiles. On the top of the cores (a few centimeters), decomposing dead body of maline lives such as echinoderms that contains trimethylamine N-oxide, a precursor of trimetylamine (TMA), in the body were accumulated. In the surface layer (< 15 cm), high concentration of ammonium, TMA, and isotopically light methane was detected. In this layer, heterotrophic microbes such as *Bacteroides*, *Firmicutes*, and *Spirochaeta* were dominated. These results suggests that huge amount of organic matter had been recently supplied on the deep-seafloor. In addition, a large number of *mcrA* gene were also detected. Most of which were identified as those of *Methanococcoides* sp. that can grow on methyl compounds as the sole energy source. From the results of investigation in 2011, we hypothesized that high concentration of methane in the microbial mat sediments were generated by methylotrophic methanogen.
On the 2012 cruise, we conducted in-situ incubation to prove our hypothesis. In-situ incubation cores with ^{13}C substrate, ^{13}C-bicarbonate, ^{13}C-acetate, ^{13}C-monomethylamine (MMA) were set on the deep-seafloor where a large microbial mat had been found in 2011 and measured methanogenesis activity. During three days of incubation, significant activity was detected only in the incubation core supplied MMA.
We hope that our results provide important hints to understand the ecology and evolution of methanogenic/methanotrophic archaea in deep-sea environments.

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