Hyperpycnal sediment in Lake Inawashiro, northeast Japan

*Yoshio Inouchi[1], Takashi Suzuki[1]

1.Faculty of Human Sciences, Waseda University

In Lake Inawashiro, northeastern Japan, there are characteristic layers which show relatively thick dark brown color underlain by white layer. These layers have, in general, few centimeters in thickness and differ in thickness from main sediment which have a few millimeter in thickness. In this presentation, we discuss the origin of these characteristic sediments, namely event sediments. Lake Inawashiro, in central Fukushima prefecture, is an acidtrophic lake and has an area of 103.24km2, maximum depth 94.6m and mean depth 51.5m. Main part of the cored sediment is composed of bar code like sediments with thin dark and light colored layers. In addition to several tephra layers, about 30 characteristic layers were observed. Grain size measurement and sediment grain observation using microscope were carried out in each 5mm thick sample. The result shows that reverse grading at lower part and normal grading at upper part, and that the characteristic layers sometimes contain plant fragments and diatom fossils in addition to many mineral grains. Preliminary observation of diatom assemblages in characteristic layers show presence of attached diatom and acidophilic diatom, however, further observation is needed. In one of the characteristic layers, inner sedimentary structure of erosion between light colored layer and dark layer. Furthermore, diatom assemblages of general thin alternations of light and dark layers show only presence of planktonic diatoms. In conclusion, these facts show the characteristics of hyperpycnal flow deposits. Consequently, those event sediments in Lake Inawashiro are derived by hyperpycnal flow caused by abrupt drastic flooding

Keywords: Lake Inawashiro, hyperpycnal, event sediment, lake bottom sediment

"Hot spot of methanogeneis" on the deep-seafloor after the mega-erathquake

*Eiji Tasumi[1], Hidetaka Nomaki[1], Katsunori Yanagawa[2], Yuuta Konno, Sanae Sakai[1], Miho Hirai[1], Katsunori FUJIKURA[1], Takuro Nunoura[1], Ken Takai[1]

1.Japan Agency for Marine-Earth Science and Technology, 2.Kyushu University

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.

Keywords: deep sea, methanogenesis, mega-earthquake

