Interaction between submarine landslides and subseafloor sedimentary microbiome: Chikyu SCORE Expedition 910 off Cape Erimo

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During the past decades, scientific ocean drilling has explored the subseafloor sedimentary biosphere down to over 2 kilometers below seafloor (Inagaki et al., 2015). The total biomass and diversity of microbial community in the subseafloor biosphere are comparable to those in the hydrosphere (Kallmeyer et al., 2012). Taxonomic composition of subseafloor microbial communities are distinct from those of other habitats on Earth’ s surface, such as ocean and soil, inferring that adaptive evolution of microbial community to the energy-limited deep sedimentary habitats have occurred. In a previous study of bioturbated layers in surface marine sediments, it has been reported that seawater-migration by macrofauna activity during the initial depositional stage notably affected microbial community structures (Chen et al. 2017). Similarly, it can be hypothesized that submarine landslides have introduced easily degradable fresh organic matter and dissolved electron acceptors (e.g., oxygen, sulfate) to the sedimentary habitats, and consequently caused a shift of microbial communities and its function.

In 2017, we conducted the Chikyu’ s first SCORE Expedition 910 at the Hidaka Trough off Cap Erimo and obtained sediment cores down to 100 meters below the seafloor. In the core column, four intervals of deformed sediments were identified, indicating the occurrences of multiple submarine landslides in this area. In those deformed sediment intervals, we observed no clear anomaly in the profile of cell abundance, which decrease with sediment depth as generally seen in the other subserfloor sediments. In addition, pore water chemistry data do not show clear anomaly either, indicating recovery of sediment geochemistry from the turbation caused by landslides. While both profiles of microbial cell abundance and pore water geochemistry did not show anomaly in the deformed sediment intervals, the DNA-based analyses, showed some unusual appearances of microbial taxa relative to the depth, suggesting the potential migration of microbes from the upper horizons by submarine landslides.

Reference

Inagaki F, et al (2015). Science 349: 420-424; Kallmeyer J, et al (2012). Proc Natl Acad Sci U S A 109: 16213-16216; Chen X, et al (2017). Sci Rep 7: 2400.

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