

The “Marathon” Project at the Mariana Trench: Integration of physical, geological and biological approaches for exploring the hadal biosphere

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Hadal biosphere (below 6000 m water depth) is the least explored in marine microbiology. We have established a team of physical oceanographers, chemists and microbiologists to study the biogeochemical processes in the Mariana Trench under the project “Mariana Trench Observation (Marathon)”. Our first expedition was in January 2016, which allowed us, for the first time, to collect large volumes of water (~100 liters) down to a depth of 8727 m using a specially designed CTD system. A suite of analyses were obtained on board the ship, which included temperature, pH, salinity, dissolved oxygen and nutrients (N, P, and Si); results are consistent with those of an earlier study in the Mariana Trench, which collected limited amount of seawater at different depths (Nunoura et al. 2015). Our sampling method will allow us to obtain metagenomes of the hadal microbial community, which is lacking at depth below 6000 m. Comprehensive chemical and microbiological analyses are underway, which will provide a better understanding of the biogeochemical processes in the deep Mariana Trench. Furthermore, sediment traps and a tripot, moorings, and earthquake monitors were deployed at the Mariana Trench, which will help better evaluate how the ecosystem functions in the dynamic hadal environment.