’UltraH3 Linkage’ and ’Hydrogen World’: two key hypotheses to test as interrelationship between Earth and Life

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Discovery of deep-sea hydrothermal system along Mid Ocean Ridges (MOR) in the end of 1970s provided an expanded view of the deep sea, which had been long believed to be a cold, dark, and barren environment. Unexpectedly, a dense, abundant and diverse population of animals was found around the venting of geothermally super-heated water, and it soon became apparent that these macrofaunal populations were strictly dependent on the primary production of symbiotic and free-living chemolithoautotrophic microorganisms, which obtain energy for carbon fixation, biosynthesis and other any living activities from inorganic substances such as CO2, H2S, H2 and etc. entrained by hydrothermal fluids from the earth interior. Much of the initial research focused on the Mid Ocean Ridge (MOR) hydrothermal systems, however recently, the greater heterogeneity of the hydrothermal fluid geochemistry and hydrothermal fluid-associated ecosystem has been explored in the subduction zones, so-called Volcanic Arcs (VA) and Backarc Basins (BAB), of the Western Pacific region.

Phenomena and events on deep-sea hydrothermal systems have been fascinating scientists from different fields of sciences, who are interested in plate tectonics, mantle dynamics, magmatism, volcanology, ocean geochemistry, and microbiology and biology under extreme environments. Deep-sea hydrothermal systems have also strongly inspired an idea that they are favorable places for the origin of life in this planet about 4 billion years ago. However, the research interests have been pursued from each of the research fields and very few interdisciplinary goals have been achieved.

Throughout discussion in this session, we, different fields of scientists in InterRidge Japan, are going to share a consent how we can commonly approach sorts of interdisciplinarily integrated research themes on ocean floor and subseafloor. Here, as potential break out topics, I will introduce two key interdisciplinary hypotheses exemplifying interrelationship between Earth and Life. One is & #39;Ultramafics-Hydrothermalism-Hydrogenesis-HyperSLiME& #39; (UltraH3) Linkage hypothesis for early evolution of Earth and Life. The other one is a hypothetical model of & #39;hydrogen-dependent ecosystem& #39; (H2 world) in global deep-sea hydrothermal systems. Both hypotheses should be investigated by & #39;true& #39; inter-fields of sciences. Several keys could be found in these research projects.