

Life Deeply Concealed in the Earth

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Almost a century ago, many peoples, many people including scientists believed that there was no life in deep ocean on our planet. The harsh environmental conditions, e.g. high hydrostatic pressure, limited food supply and temperature close to the freezing point at great water depth, were used to explain the suspected absence of life in the deep sea. New technologies led to an increasing number of geologists, geophysicists, geochemists and (micro-)biologists that explored this hitherto unknown environment over the past decades. Throughout the use of manned deep-sea submersible vehicles (DSV), remotely operative vehicles (ROV), autonomous underwater vehicles (AUV) or deep-sea drilling vessels, even the greatest depths of the “blue planet” Earth became accessible.

This exploration has revolutionized our former perception of life that is deeply concealed in the Earth. We now know that the deep ocean and crust is not a barren, desert-like system but harbors a great biomass and diversity of life than previously assumed. Deep-sea hydrothermal systems and cold seepages, for example, are really ubiquitous in the deep ocean and sustain prosperous microbial and macrofaunal communities with energy and carbon sources from the Earth interior. Recent findings suggest that continental and oceanic subsurface environments harbor microorganisms in deep sediments, supposed to be one of the largest biomass pools in this planet. The frontier of sciences in these fields is now to explore the function and interaction of these yet poorly understood life forms with the local and global environments, and their significance in the co-evolution of Earth-Life over the past ~4 billion years.

For the first Japanese-German Frontiers of Science Symposium, the Earth

Science/Geoscience/Environment session is dedicated to the topic “Life deeply

concealed in the Earth”. We were able to invite four of the world-leading scientists

working in this amazing field of deep-sea research. Starting here, we, PGM of Earth

Science/Geoscience/Environment topic, would like to invite you the session titled “Life

Deeply Concealed in the Earth”. We inquired for 4 frontrunners to introduce the frontier

of sciences in these fields. As icebreaker, we have with a brief presentation on the

research background of life deeply concealed in the Earth and the newest technologies

that enables us to study even the greatest depths of on the Earth. Takeshi Kakegawa will

talk about the review of the primordial chemical evolution triggering origin of life and his new data suggesting that it is in the deep crust. Antje Boetius will concentrate on chemosynthetic microbial communities inhabiting anoxic environments in the ocean. Yohey Suzuki will introduce the microbial-mineral interaction in the deep subsurface and ocean and novel symbiosis found in a deep-sea hydrothermal environment involved in biomineralization. Lastly, Kai-Uwe Hinrichs will present recent findings of microbial communities which live hundreds of metres beneath the seafloor. We would be very happy if you could enjoy the spectacular world of life.