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Deep Life & Carbon: Exploration of the Marine Interttrestrials with Scientific Ocean Drilling and Geobiotechnology

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Since the discovery of unseen life, so called "Microorganisms" by Antoni van Leeuwenhoek in 167 4, small life forms have given tremendous benefits to human activities such as foods and medicals. During the evolutional processes of life on earth history, microbial ecosystems play some roles in balancing and maintenance of earth system at some events associated with geological motions and climate changes. To date, the Earth is considered as the microbial planet, which habitable zone goes deep within the planet earth that we have never reached. Deep Life of Interterrestrials: this is the deep, dark and grim world of single cell forms without sunlight, and of different dimension to our surface world. The deep subseafloor biosphere is the frontier scientific research field for the comprehensive census of modern and past ecosystems and biogeochemical processes, which has a great potential to bring the paradigm shift on geosciences and life sciences since the demonstration of plate tectonics.

The deep-earth riser-drilling research vessel "Chikyu" is unique platform of scientific ocean drilling, enabling sample retrieval for deep-biosphere studies from great depths beyond our previous achievements. A number of fundamental questions, such as the extent and limits of life, bio-geo-chemical reactions and elemental cycles supporting activity of deep and surface life, ecological roles of deep microbial activities in the mantle-life-ocean-atmosphere interactions, will be or must be clarified by long-term sciences using "Chikyu" with multiple interdisciplinary earth-scientific projects. Japanese initiative and long-term international operation of "Chikyu" is indispensable; the positive and responsible actions will build up national strength of science and technology, and open new insights into some important ecological problems for earth's life sustainability.

"Deep Life and Carbon" using as the keyword, the broad vision of scientific ocean drilling will be discussed in terms of the significance and future directions of deep-biosphere studies including the application of new science field of Geobiotechnology.

Keywords: Scientific Ocean Drilling, IODP, Deep-biosphere, Chikyu