
[JJ] Evening Poster | B (Biogeosciences) | B-BG Biogeosciences & Geosphere-Biosphere Interactions

[B-BG02]Interrelation between Life, Water, Mineral, and Atmosphere

convener:Ken Takai(Extremobiosphere Research Center, Japan Agency for Marine-Earth Science & Technology), Kentaro Nakamura(Department of Systems Innovation, School of Engineering, University of Tokyo), Yuichiro Ueno(東京工業大学大学院地球惑星科学専攻, 共同), Yohey Suzuki(Graduate School of Science, The University of Tokyo)

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Life on Earth is based on a diversity of physical and chemical dynamics and processes throughout the history. Interaction between life, water, mineral (rock) and atmosphere is a key to understand co-evolution of Life and Earth. It is a brief since the pioneers proposed this session almost 20 years ago. Current JpGU meeting is filled with international- and interdisciplinary-joint sessions with similar aims to this session in responding to surrounding situations of JpGU and earth science field in Japan. Conveners believe that this session has provided an excellent opportunity to discuss such interdisciplinary research results and directions for about 20 years but are also afraid if this session may complete the initial goal. It is a matter for JpGU members to decide. This is a final call whether this session will continue in future. If you need this session, you will submit abstract of your research to this session for oral presentation with your intension. If we have less than 12 abstracts for oral presentation, we will cease this session in 2018. Join to this session!

[BBG02-P01]New evidence and significance of biogenic Mn oxides in 12Ma carbonaceous sedimentary rocks in the Hokuroku district, Akita: constrain from fossil DNA and magnetic field

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Keywords:biogenic Mn oxides, low temperature hydrothermal activities, DNA extraction, Magnetic field

Mn oxides are commonly found on the modern seafloor or around the terrestrial hot springs. Role of Mn-oxidizing bacteria has been discussed by previous investigators to promote precipitation of Mn oxides. However, it has been challenging to distinguish biogenic Mn oxides from abiogenic Mn oxides, because of their mineralogical similarity. It will become possible to identify biogenic Mn oxides, by accumulating unique characteristics of biogenic Mn oxides and clarifying differences with abiogenic Mn oxides. Such characteristics of biogenic Mn oxides will be used as a tool, i.e., mineral bio-marker, to find the evidence of Mn-oxidizing bacteria in the ancient rocks, in particular from Archean.

Stratified and disseminated Mn ore deposits are present in the Hokuroku district, Akita prefecture. Significant amounts of Mn were mobilized in host rocks by ca. 12 Ma submarine hydrothermal activities and then Mn oxides were precipitated on or beneath the seafloor. One type of ore has a colloform structure, which resembles the stromatolite, with Mn oxides (todorokite) and reduced carbon. Fossil DNA extraction was successful from this Mn ore, excluding the possibility of later contamination. This is the first success of DNA extraction, specific for Mn-oxidizing bacteria (*Acinetobacter* and *Pseudomonas*), in geological samples as old as 12 Ma. As a result, two kinds of Mn-oxidizing bacteria, which are commonly found in the surface of modern ferromanganese crusts, are identified. In addition, magnetic field was detected on Mn oxides in colloform structure by magnetic field microscopy (MFM). Magnetic field is generated when Mn oxide has high cation vacancies and abundance of Mn⁴⁺, which are common in biogenic Mn oxides.

The above comprehensive analyses on the same Mn oxides indicate that Mn oxides in colloform structure are biogenic in origin. This study will be utilized in the search for ancient biogenic Mn oxides and give a hint to understand the ancient Mn cycles.