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

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

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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-P07] Interaction between minerals and microbes in the Earth surface, and its evolution

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Keywords: mineral-microbe interaction, Earth Surface, evolution, Mn-nodule, Biologically Induced Iron Ore, magnetotactic bacteria

Interaction between minerals and microbes in the Earth surface, and evolution the Earth Surface were reviewed. Some examples of the interaction between bacteria and minerals are shown as follows. Hypothesis of Mn-nodule being deep sea stromatolite with fractal-like characteristics was demonstrated based on mineralogical descriptions by LM, SEM, HRTEM, XRD, X-ray CT imaging and mathematical simulation. Iron Ore deposit in Gunma Iron Mine was described and clarified as Biologically Induced Iron Ore deposit. This Iron mineralization is showing contrast to mineralization in Precambrian iron formation. Placer Gold samples from Sado Island were mineralogically examined and biological signatures were suggested. Nano size gold grains were accumulated by bacteria and diatoms in the experiments. About As contamination of groundwater in Asia region, there were two possibilities of oxidative or reductive dissolution. The mechanism was experimentally examined from the standpoint of mineral-microbe interaction. The dissolution mechanism of As was demonstrated as reductive dissolution by accelerated reducing the environment by bacterial action. Cs contamination in the environment by Fukushima Dai Ichi NPP Accident was examined by using bacteria obtained from litate village. Culture experiment using the bacteria, non radioactive 1% CsCl solution and culture medium showed that 38% Cs acculumation in the globule inside the bacteria. This suggests some role of bacteria in the future re-circulation of Cs in the environment. Framboidal pyrite is common material in the muddy sediments and we found icosahedral framboid. Formation of framboidal pyrite by adding culture medium of sulfatle reducing bacteria was found. Magnetotactic bacteria were examined mineralogically. Evolution order of magnetosome form was suggested as follows; octahedral, to hexagonal prism and finally to tear drop type. This is supported in the magnetic domain diagram (Banerjee and Butler, 1975). The formation of the magnetosome may be related to the origin

of Biologically Controlled Mineralization.

Furthermore, principles of Mineral behaviour are discussed from thermodynamics and the concept of 'mineral evolution' by R. Hazen (2008) was also examined. Finally, Earth Surface evolution and the key role of minerals as 'nodal point' in the evolution are emphasized.