[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)

Mon. May 21, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

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-P09]^{230}Th ages of brucite-carbonate chimneys at the Shinkai Seep Field, southern Mariana forearc

*Tomoyo Okumura[1], Chuan-Chou Shen[2], Marjoor Ahmad Lone[2], Tsai-Luen Yu[2], Akihiro Kano[3], Amekawa Shota[3], Taiki Mori[4], Yasuhiko Ohara[5,6] (1.Center for Advanced Marine Core Research, Kochi University, 2. High-Precision Mass Spectrometry and Environment Change Laboratory (HISPEC), Department of Geosciences, National Taiwan University, 3.Department of Earth and Planetary Science, The University of Tokyo, 4.Graduate school of integrated science for global society, 5.Hydrographic and Oceanographic Department of Japan, 6.Department of Subsurface Geobiological Analysis and Research, Japan Agency for Marine-Earth Science and Technology)

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Serpentinite-hosted fluid vent systems have attracted interest as analogues for the place of birth of life on the Earth as well of extraterrestrial life expected on Mars and Enceladus. During the past five-years expeditions, brucite-carbonate chimneys were discovered from the deepest known (~5700 m depth) serpentinite-hosted ecosystem, the Shinkai Seep Field (SSF) in the southern Mariana forearc [1]. Previous study for the chimney textures and mineralogies recognized two types (type I and II) of active chimneys formed under compensation of the precipitation and dissolution of constituent minerals [2]. Type I chimneys are mainly consist of brucite; these formed as a result of rapid precipitation under high discharge of alkaline fluid. In this type of chimneys, filamentous microbial cells were often mineralized by brucite. Type II chimneys are characterized by inner brucite-rich and outer carbonate rich zones and were likely formed under lower fluid discharge than the type I chimneys. Type II chimneys are covered with non-lithified grayish microbial mats and colonies of *Phyllochaetorterus*. In this study, we applied uranium-thorium disequilibrium dating for the two types of chimneys to elucidate the history of the chimney growth.

Ages of the type I chimneys ranged from modern to 14,000 yrs and its median age was 350 yrs. The type II chimneys showed older age than that of type I, which ranged from 1,600 to 18,000 yrs with 6,000 yrs

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median age. These results indicated that the intensity of fluid discharges also controlled growth rate of the brucite-carbonate chimneys. The broad age ranges likely resulted from the compensation of mineral precipitation and dissolution occurring below the local carbonate compensation depth. Such conditions provides a habitat for microbes and animals for >10,000 yrs on deepsea floor, which are encased in mineral precipitates.

References

[1] Ohara et al. (2012) Proc. Natl. Acad. Sci. U. S. A., 109, 2831–2835.
[2] Okumura et al. (2016) Geochem. Geophys. Geosys. 17, 3775–3796.

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