[JJ] Evening Poster | B (Biogeosciences) | B-CG Complex & General

[B-CG09]Decoding the history of Earth: From Hadean to the present

convener:Tsuyoshi Komiya(Department of Earth Science &Astronomy Graduate School of Arts and Sciences The University of Tokyo), Yasuhiro Kato(Department of Systems Innovation, Graduate School of Engineering, University of Tokyo), Katsuhiko Suzuki(国立研究開発法人海洋研究開発機構・海底資源研究開発センター)

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The latest results of Earth's evolution and geological processes through 4.6 billion years from Hadean to Modern, based on various approaches including fieldworks, chemical analyses, experiments and computer simulation, will be presented. In this session, we aim to discuss and understand causal relationships and interplay among the evolution of Earth's deep interior, changes in the surface environments, and development and evolution of life. Wide-ranging topics are accepted.

[BCG09-P07]Origin of negative carbon isotope anomaly in a 2.7 Ga shallow water deposits

*Beomsik Kim[1], Yuichiro Ueno[1,2,3], Alexis Gilbert[1,2] (1.Department of Earth and Planetary Sciences, Tokyo Institute of Technology, Meguro, Tokyo, 152-8551, Japan (Dept. EPS, Tokyo Tech.), 2.Earth-Life Science Institute (WPI-ELSI), Tokyo Institute of Technology, Meguro, Tokyo, 152- 8550, Japan (ELSI, Tokyo Tech.), 3.Department of Subsurface Geobiological Analysis and Research (D-SUGAR), Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Natsushima-cho, Yokosuka 237-0061, Japan)

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Sedimentary organic carbon in some Late Archean rocks are anomalously depleted in ^{13}C (δ$^{13}C_{org}$ = -45 to -60‰). The origin of the isotope anomaly is still unknown and is possibly resulted from biological uptake of methane (methanotrophy) or deposition of hydrocarbon haze. To test the hypotheses, small-scale isotopic analyses of both inorganic and organic carbon were conducted for various lithologies of 2.7 Ga sedimentary rocks in Fortescue Group, Western Australia. For this purpose, a new analytical method was developed for measuring small samples. As a result, low δ^{13}C organic matter occurs not only in stromatolite as previously pointed out, but also in black laminated mud. Also, the δ$^{13}C_{org}$ seems not correlated with δ$^{13}C_{carb}$ value as opposed to the case expected when methanotrophs are active because methanotrophs typically produce not only very ^{13}C-depleted organic matter but also CO_2. These results do not support the methanotrophy scenario. Furthermore, a relationship between δ$^{13}C_{org}$ value and TOC contents is consistent with a mixing of two organic end-members with different isotopic ratios. The observed δ$^{13}C_{org}$-TOC trend appears to occur in each lithology of the sedimentary rocks, suggesting that the source of the low δ$^{13}C_{org}$ distributed uniformly irrespective to the depositional environment. This may suggest that the anomalously ^{13}C-depleted organics could have been deposited from atmosphere at about 2.7 Ga.