Oral | Symbol B (Biogeosciences) | B-PT Paleontology

[B-PT23_30PM2]Decoding the history of Earth: From Hadean to Modern

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Wed. Apr 30, 2014 4:15 PM - 6:09 PM 411 (4F)

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.

6:00 PM - 6:09 PM

[BPT23-P04_PG]Differentiation and material recycling of Archaean mantle estimated from North pole basalt, Western Australia

3-min talk in an oral session

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Mid-ocean ridges and hotspots are the prominent surface manifestations of mantle upwelling with different mechanisms. In these domains, two types of basalts:, i.e., mid-oceanic basalt (MORB) and oceanic island basalt (OIB) occurare occurred, in the respective settingsly. Recent statistical analysis on the global data set of the Sr-Nd-Pb isotopic compositions demonstrates that modern MORB and OIB are clearly separated: MORB is derived from a mantle source that has undergone long-term depletion in a " melt component", while OIB is derived from a mantle source with long-term enrichment in the melt component through the recycling of subducted plate material (Iwamori and Albarede, 2008; Iwamori et al., 2010). Therefore, when plate recycling started to develop the geochemical domains is of great importance to understand the material differentiation and evolution of the Earth. In this study, we present new trace element and Sr,-Nd isotope composition of Archaean MORB and OIB, in order to discuss the differentiation of the mantle at that period and compositional evolution of the mantle for a longer period of the Earth's history. The basaltic rocks of ca. 3.5 Ga from North Pole in northwestern Australia have been analyzed, which include have been classified as MORB and OIB by their geological occurrence and stratigraphy in by Komiya et al. (2002). The rocks have undergone greenschist to /amphibolite facies transition metamorphism (Komiya et al., 2002). The original rock compositions may have been modified by metamorphism. In order to examine potential metamorphic modification of the bulk rock composition, so we have measured composition of igneous clinopyroxene which shows original igneous texture, in addition to bulk composition, with special reference to equilibrium/disequilibrium partitioning of trace elements between clinopyroxene and the bulk rocksestimate the effect of

metamorphism using partition coefficient. The composition of North Pole MORB (NP MORB) and OIB (NP OIB) show slightly different trace element patterns. Some spikes in alkaline elements and alkaline earth metal elements and variabilityety of the initial Sr isotopic compositions may result from metamorphic modificationeffect. The initial Nd isotopic compositions of NP MORB and NP OIB are similar to each other. However, most of the samples have ε Nd