Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

SCG16-08 Room:201A Time:May 28 15:45-16:00

Spatial distribution of hydrogen production zone and organic carbon in the oceanic crust

ANDO, Yumi[1*] ; OKAMOTO, Kazuaki[1]

[1]Graduate school of education, Saitama University

Hydrothermal activity in the Archean-Ridge system has been considered to play a major role to maintain the oldest biosphere in early Earth. In the present ridge-system, hydrogen production in the serpentinized peridotite layer, is considered as major energy source. However, low temperature hydrothermal zone in the lower crust layer in the ridge has been recognized as hydrogen producing zone. Then what is the hydrogen source in the oceanic lower crust? Accreted oceanic plateau is one of the best sample to describe hydration process due to deep-sea-hydrothermal alteration because it is easy to observe huge outcrops and collect samples systematically in whole section. We have collected rock samples from the Mikabu high P/T rocks in Toba area, central Japan and from Ootoyo area, central Shikoku, Japan because there are large scale trench cliffs in the mine. Here, we report mineral composition surrounding organic carbon that was found in metabasaltic rocks from Otoyo area. The metabasalt underlies metachert, and exhibit extensive plagioclase veins. Carbonaceous material and FeS are concentrated near the veins. Serpentinization of olivine gabbro was recognized in the metabasalt layer as lensoid body. In the Toba area, wehrlite and hornblende gabbro are dominant as the oceanic lower crustal material, subsequently suffered high P/T metamorphism. Abundant serpentine with magnetite are along olivine grain boundaries. Cr-spinel and epidote are occasionally recognized. That is, hydrogen was produced due to hydration reaction in the intruded wherlite from the lower crust of the large plateau. Thus the graphite probably from organic carbon in the metabasalt suffered high P/T subduction zone metamorphism. In order to know the fate of the graphite in deep subduction zone, we have observed the Sanbagawa eclogite (Tonaru eclogite) accompanying cupper-iron sulfides (so called Besshi mine type Cu-Fe sulfides). In the eclogite, Cu-Fe sulfides contain silicate with graphite as inclusion. The graphite crystallization temperature calibrated using laser Raman peak shift, is estimated as 300-340 ℃. It is obviously lower than that of the metamorphic temperature of the eclogite 550-600 ℃. It clearly suggests that graphite was probably from the micro-bacteria with Cu-Fe sulfides in the hydrothermal zone in the Mid-oceanic ridge system. In summary, the lower crust might be significant zone producing hydrogen, and provide bacteria cluster above, and subsequently the organic carbon would be recycled down deep in the mantle via subduction zone.

Keywords: deep subduction zone, organic carbone