

Recycling of organic carbon related to Jurassic ridge-hydrothermal biosphere into deep mantle: Evidence from the Sanbagawa eclogite, Japan

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In order to know the fate of an organic carbon in deep subduction zone, we have observed the Sanbagawa eclogite (Tonaru eclogite) accompanying copper-iron sulfides (so called Besshi mine type Cu-Fe sulfides). The sulfides are considered as precipitates related to the Jurassic ridge-hydrothermal alteration. In the eclogite, Cu-Fe sulfides contain silicate with graphite along cracks. The rims of the sulfides are replaces as Fe-Cu oxides. It is considered that the graphites were on the sulfide and along the interstitial domain such as cracks then rim of the oxides were overgrown. The graphite crystallization temperature calibrated using laser Raman peak shift, is estimated lower than 300 °C. It is obviously lower than that of the metamorphic temperature of the eclogite 550-600 °C. 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. It is well known that the Cu-Fe oxides were formed in high P/T Sanbagawa metamorphism. Therefore overgrowth of the oxides on the studied sulfide-graphite association were in deep subduction zone. In summary, the Jurassic ridge-hydrothermal alteration provides bacteria cluster, and subsequently the organic carbon would be recycled down deep in the mantle via subduction zone.