The paradoxical trend of $\delta^{13}C_{org}$

A.A. IVANOV AND E.M. GALIMOV

A well known trend manifesting by the $\delta^{13}C_{org}$ towards a heaviness, from ancient sediments to the young ones, has been undoubtedly found long ago being studied on numerous occasions in a lot of geochemical works devoted to the geological time lasting development of the biosphere. Based on the geochemical processes regularities, possible mechanisms of this phenomenon origin were proposed to explain a nature of the global carbon isotope composition variations in biosphere [1, 2].

The situation paradox deals with a fact that due to a several isotope effects processed inside the living organisms, the isotopic-light carbon form is to be predominantly assimilated as compared to the heavier one. This is what a biological isotope effect is all about. The geochemical paradox mentioned is that it would be far more logical to expect the reverse effect in the observing trend which, nonetheless, is not the case.

In a present work, an additional and a very peculiar mechanism suitable to involve the ^{13}C isotope into the Earth bioorganic reservoir has been offered to legitimize the observing trend vector.

The key point of this mechanism consists in a crucial need for ^{13}C participation in the isotopy DNA-conformational effect which was presumably taking part in the life systems molecular evolution starting from its very beginning [3-4].

[1] Galimov, E.M. (1981) *A Nature of the Isotopes Biological Fractionation.* Nauka Publ.: Moscow. [2] Galimov, E.M. (1999) *Geokhimiya (Russ)* **60,** 345-367. [3] Ivanov, A.A. & Galimov. E.M. (2007) *Proceedings of the 18th A. P. Vinogradov International Symposium on Geochemistry of Isotopes,* pp. 106 – 108, StPSU Press: Moscow. [4] Ivanov. A.A. (2003) Geo*chim. Cosmochim. Acta* **67**(18), A 180.

Thermal and flow structure of subduction zones and water transportation into the deep mantle

HIKARU IWAMORI

Department of Earth & Planetary Science, Univ. of Tokyo, Tokyo 113-0033, Japan (hikaru@eps.s.u-tokyo.ac.jp)

Processes in subduction zones are key to understanding many of the geological phenomena unique to the Earth: e.g., earthquakes, arc magmatism, regional metamorphism, orogeny, continental growth, as well as global budgets and transportation of material and energy, bridging the surface environment and the Earth's interior. Thermal and flow structure of the subducting slab and the overlying mantle wedge is one of the most important factors that govern the various processes mentioned above, yet it remains to be constrained. In this paper, in order to better constrain the thermal and flow structure of subduction zones, geological and seismological observations and the corresponding numerical modeling are presented and consolidated. In subduction zones, thermal structure, flow structure and water distribution interplay, and they need to be solved consistently. Consequently, the numerical modeling includes generation and migration of aqueous fluid, and its reaction with the convecting solid. The model results show that an aqueous fluid released from the subducting oceanic crust forms a serpentinite layer in the mantle wedge just above the subducting slab. This layer acts as a lubricant between the subducting slab and the overlying mantle wedge, and greatly affects the thermal and flow structure to contribute to water transportation to the deep mantle. Recent seismic studies support existence of such a hydrous layer just above the subducting slab[1]. Even after the completion of dehydration of major hydrous mineral phases in the subducting materials, especially at the base of the mantle wedge just above the subducting slab, nominally anhydrous phases can carry a significant amount of H_2O (1.1 to 7.8×10^{11} kg yr^{-1}) into the deep mantle[2]. This water and the associated components may be accumulated in the deep mantle to develop unique isotopic character reflecting aqueous fluid-rock reaction, and could be the source of one of the two independent components that have recently been found in the isotopic compositional space of oceanic basalts[3].

[1] Kakatsu, H. & S. Watada (2007) *Science* **316**, 1468. [2] Iwamori, H. (2007) *Chem. Geol.* **239**, 182. [3] Iwamori, H. & F. Albarède (2008, in press) *G-cubed.*