# Primary melts reveal small-scale heterogeneity in convecting mantle

A.V. SOBOLEV[1,2], A. W. HOFMANN[1], N. SHIMIZU[3], M. CHAUSSIDON[4], N.METRICH[5] , I.K. NIKOGOSIAN[6] AND A.T.ANDERSON[7]

[1] MPI, Mainz, Germany (asobolev@mpch-mainz.mpg.de)
[2] Vernadsky Inst., Moscow, Russia (asobolev@geokhi.ru)
[3] WHOI, Woods Hole, USA (nshimizu@whoi.edu)
[4] CRPG-CNRS, Nancy, France (chocho@crpg.cnrs-nancy.fr)
[5] CNRS-CEA, CEA/Saclay France (nmetrich@cea.fr)
[6] Vrije Uni., Amsterdam, Netherlands (niki@geo.vu.nl)
[7] Chicago Uni., USA (canderso@midway.uchicago.edu)

Systematic studies of melt inclusions in the earliest olivine crystals from mantle plumes (Hawaii) and Mid-Atlantic ridge were carried out by ion microprobes for trace elements and Pb, Li and B isotopes and nuclear probe for C concentrations. These data and modelling reveal the following major results:

1. Each volcanic plumbing system or particular studied lava represents mixing of numerous primary melts, which are often generated in different isolated mantle sources. This should caution us when using bulk rocks compositions in geochemical and petrological models (see Figure).

2. Unmixed primary melts are rare and show extreme compositional ranges far exceeding those of bulk surface lavas (see Figure). They are usually found as inclusions in the earliest crystals formed in the deepest parts of plumbing system.

3 .The compositional and isotopic ranges of the recovered primary melts suggest highly efficient open system melting, fast melt transport, and small-scale compositional heterogeneity of mantle sources in all volcanic environments studied so far.

A case study of the Hawaiian mantle plume suggests that compositional heterogeneities in the mantle source beneath Hawaiian volcanoes are produced by mixing and reaction of mantle with recycled fragments of old subducted oceanic lithosphere.

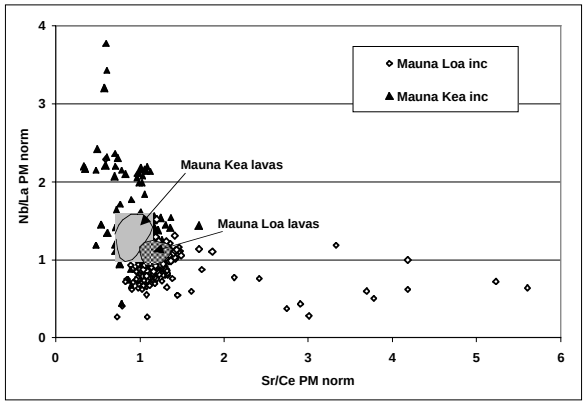


**Figure.** Bulk lavas and melt inclusions in olivine in adjacent Hawaiian volcanoes Mauna Loa and Mauna Kea. Inclusions show end-members and source compositional heterogeneities, which are present in lavas in highly attenuated form.

# Whether or not the isotope relation among the biogenic elements is being an indicator of organism's functional state?

E.V. SOBOTOVICH, O.V. KORKUSHKO, O.B. LYSENKO, V.B.SHATILO

[1].Institute of environmental geochemistry NAS of Ukraine
[2].Ecology of human Ukrainian branch (human@kiev-page.com.ua)
[3].Institute of gerontology NAMS of Ukraine

**Concept of isotope metabolism.** Two interrelated hypotheses are advanced: 1. With increasing the mass of nucleus and as the difference between isotope nucleus masses is decreased, on one hand, the contribution of all isotope effects associated with kinetics reduces. On the other hand, the role of isotope effects associated with the difference among nuclei quantum characteristics and the electron shell state in molecular system increases. 2. All the living organisms have specific intervals of isotope relation for each biogenic element. The disturbance of these relations (isotope shift) plays a substantial role in changing the functional (biological) activity of living organisms.

It is suggested that comparison between the major bioorganic element isotope shift and living organism functional activity will make it possible to reveal the role of these shifts for variation of functioning of both plants and animals (development of phyto – and zoo-pathologies depending on the degree and kind of contamination for the territory of their growth) and man (aging and progressing of any pathology). One can reasonably suggest that this notion may form the basis for the both organism habitat media and for medico-clinical diagnostics assessment. The aim of our study was to determine age-related changes of carbon isotope correspondence at aging for healthy people and for those patients with cardiovascular pathology.

***Methods and Results***: Medical examination was concerned with population being divided into three groups accordingly to their age. The washed up erythrocytes being obtained from the venous blood samples were used. Pathology of cardiovascular system in elderly people exerts a substantial effect on proportion between the heavy carbon isotopes and the light ones. The decrease of this index points to the fact of carbon heavy isotope accumulation in erythrocytes. It is significant that there is a correlation link between the isotope interrelation indices of carbon and metabolism. This fact testifies, in a certain extent, to carbon isotope distribution influence for the intracellular metabolism reaction intensity. In our opinion the further study should determine the role of changes in isotope formula of some biogenic elements in various pathology formation, also the dependence of these changes on ecological factors.