

Anthropogenic radionuclides distribution pattern in the Kara Sea: Biogeochemistry facets

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We were aimed at study the following tightly related biogeochemistry facets and radionuclides behaviour in the Kara Sea [1]:

Investigation of organic colloides of different molecular masses using ultrafiltration technique and water suspended material to justify the radionuclides Cs-137, Pu-239,240, Sr-90 behaviour in the river Yenisei and Kara Sea water area;

Biogeochemistry of suspended organic matter and sediments, including organic carbon concentration and isotope composition along the quasimeridional section “river-sea” (69-78N) to compare the $\delta^{13}\text{C}_{\text{org}}$ values and radiocaesium and radioplutonium activity in sediment;

Distribution pattern of the ^{137}Cs and $^{239,240}\text{Pu}$ all over the surface sediment in the Kara Sea with relation to the redox condition and lithology of the sediment.

Direct positive correlation was established in sediments between concentration organic carbon, $\delta^{13}\text{C}_{\text{org}}$ and ^{137}Cs activity. The correlation of caesium with $\delta^{13}\text{C}_{\text{org}}$ values in sediment might be explained by the presence of common carrier –clayey minerals -for terrestrial organic matter and ^{137}Cs . ^{137}Cs was present in the water suspension and did not associated with organic colloids. Most of $^{239,240}\text{Pu}$ is associated with organic colloids of high molecular mass (> 2000Da), whereas about 80 % of ^{90}Sr was present in the fraction of lower molecular mass (<800 Da) [2].

[1] Galimov *et al.* (2006) *Geochem. Internat.* **44**(11) 1139-1191. [2]. Stepanets *et al.* (2003) *Radiochem.* **45**,414-419.

Olivine-Ti-clinohumite veins and their relation to partial dehydration of high pressure serpentinites

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A major question concerning the dehydration of subducted ultramafic (UM) rocks is the extent to which they are open to externally sourced fluids during their metamorphic history. In the present study we explore peak-metamorphic veining during the evolution of high pressure (HP) serpentinites of the Erro-Tobbio Unit (ET), Ligurian Alps, Italy. The ET Unit represents ultramafic mantle (UM) that was hydrated on the Tethys ocean floor. The UM rocks were then subducted to depths of 65-80 km at around 550-600°C and developed olivine (Ol) + Ti-clinohumite (Ti-Cl) + antigorite (Atg) + clinopyroxene (Cpx) + magnetite (Mag) peak mineral assemblage. The same minerals dominate adjacent HP veins, but their proportions are different. Olivine has abundant Mag and fluid inclusions (FI) in wall rocks as well as in the veins, and is often accompanied by FI-rich Ti-Cl. The ET HP serpentinites went through partial dehydration to form Ol + Atg from brucite (Brc) + low-T serpentine polymorph (Srp) [1]. Fluid in the ET rocks was partly channelized and migrated as attested by the veins. Vein bulk rock trace element concentrations show enrichment in Ti, Ba, Nb, Li, HREE and Cu relative to the wall rocks, accompanied by depletion in Cr. Based on trace element distribution in Srp of recent ocean-floor serpentinites decomposition of Brc + Srp produces relatively dilute fluids. This requires high net fluid flux to produce HFSE-rich veins. However, disequilibrium in and around fluid conduits may enhance reactions and trace element uptake from the fluid. High concentration of certain trace elements in vein Cpx (e.g. Sr 191-202 µg/g) and Ol (e.g. Li 9.8-35.5 µg/g) are therefore not necessarily indicative of significant addition of these elements from an external source. Our study emphasizes the importance of mineral stability and trace element chemistry in influencing bulk rock geochemical evolution.

[1] Scambelluri M., Rampone, E. & Piccardo, G.B. (2001) *J. Petrol.* **42**, 55-67.