Uranium, thorium and REE in macrofungi from pristine and polluted sites

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In recent years, interest in the biogeochemical roles of fungi in the environment has increased rapidly. Part of this research involves studying the ability of macrofungi to accumulate trace elements in fruit-bodies. Available data on some elements are rather scant or even equivocal. Specifically, ambiguous data have been reported for U, Th and REE. Since recent studies highlighted the possible role of fungi in the environmental biogeochemistry of U (Fomina *et al*. 2007, Env. Microbiol. 9: 1696-1710), there is an obvious need for more knowledge of macrofungal ability to accumulate U.

We have determined concentrations of U, Th and REE (HR-ICP-MS) in a representative set of macrofungi from unpolluted sites with differing bedrock geochemistry. Analytical results are supported by use of certified reference materials and the reliability of the determination of U was verified by epithermal neutron activation analysis (ENAA).

It appears that some data recently published on these elements are erroneous, in part because of use of an inappropriate analytical method; and in part because of apparent contamination by soil particles resulting in elevated levels of Th and REE. Macrofungi from unpolluted areas, in general, did not accumulate high levels of the investigated metals. Concentrations of U and Th were generally below 30 and 125 ng g^{-1} (dry weight), respectively. Concentrations of REE in macrofungi did not exceed 360 ng g^{-1} and their distribution more or less followed the trend observed in post-Archean shales and loess.

Concentrations of U in macrofungi from mine tailings and U-polluted forest plantations in the former Příbram mining district (Central Bohemia, Czech Republic) were significantly elevated but rather low; the highest values were in lower units of μg g^{-1}.

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The roentgenoluminescence of feldspars from granitoids of the Kolyvan'-Tomsk folded belt as a typomorphic character

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Basic luminogens within the earth's crust, 92 % of which is formed of silicates, are defects in silicon-aluminum-oxygen tetrahedron (O^-) and isomorphic admixtures instead of K, Na, Ca, Mg, Al, Si (Tl^+, Pb^{2+}, Mn^{2+}, Fe^{3+}, Cr^{3+} and rare earths). L of O^- defects may be regarded as background. Its intensity is often determined by presence of decay structures and cooling rate. L of impurity defects in the earth's crust minerals depends on formation conditions (depth, crystallization temperature and cooling rate). The study has been carried out on the roentgenoluminescence spectra in the wavelength optical range (250-900 nm) in common potash feldspars (CPFS) and plagioclases from granitoids of the Kolyvan'-Tomsk folded belt (KTFB). Feldspars (FS) from all rock diversities of the Kolyvanskiy, Barlakskiy, Obskoy and Novosibirskiy massifs situated in the western part of KTFB nearby the Novosibirsk Trough have been the object of the investigation. The cause and effect relationship has been ascertained between the composition, structural ordering, crystallochemical characteristics and luminescence of the feldspars under consideration. The RL spectra of the Barlakskiy, Obskoy and Kolyvanskiy feldspar massifs are of similar character and result from the slow cooling in the conditions between the average and hypabyssal depths. The peculiarities of the RL spectra of the FS granitoids of the Novosibirskiy massif suggest the quick cooling of these rocks in the conditions of shallow depths or of the tectonically active zone (in the zone of crush). The dominating and extremely intensive RL of Fe^{3+} in the rocks of all massifs is frequently indicative of the existence of the hyperalkaline silicate melt for all objects under consideration. The presence of the Tl^+ RL with the maximum of 285 nm is the distinctive property of leucogranites from the Kolyvanskiy and Barlakskiy massifs, suggests the presence of the rare metal mineralization and is applicable as a typomorphic character. *These researches have been supported by the Ministry of Education and Science of Russia*.