



академик  
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## СОВРЕМЕННЫЕ НАПРАВЛЕНИЯ РАЗВИТИЯ ГЕОХИМИИ

Материалы Всероссийской конференции  
с международным участием,  
посвящённой 60-летию Института геохимии СО РАН  
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the salinity. The substantially low C-value, Rb/Sr ratio and significantly high ratios of Sr/Cu and Sr/Ba show that these sediments were deposited during the warm and humid periods and that the paleoclimate controlled the terrigenous sediment flux. Chemical index of alteration (CIA), A-CN-K ternary diagram and high Th/U ratios indicate that the parent rocks of the sediment experienced moderate chemical weathering.

## SEDIMENTARY FEATURE IN LAKE ULAAN AND HOLOCENE PALEOCLIMATE OF THE GOBI REGION

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This study considers sedimentological feature in Lake Ulaan, lying in the most eastern part of the Valley of Lakes, and reconstructs Holocene paleoclimatic changes of Gobi region in Mongolia. In Oct, 2015 four sediments (UN15-1a, band UN15-2a, b) were sampled from 5 and 20 cm depths on two points in Lake Ulaan. These sediments were geochemically analyzed, and contents of oxides SiO<sub>2</sub>, TiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, Fe<sub>2</sub>O<sub>3</sub>, CaO, MgO, Na<sub>2</sub>O, K<sub>2</sub>O, MnO and P<sub>2</sub>O<sub>5</sub> and radiocarbon (<sup>14</sup>C) dating were determined in the sediments. Chemical index of alteration indicates that weathering intensity is higher in the sediments UN15-1b and UN15-2b. This implies that humid climates dominated in the Gobi region of Mongolia between middle Holocene and late Holocene. Lower weathering intensity in the sediments UN15-1a and UN15-2a shows the presence of arid climates in the late Holocene.

## RADIOGEOCHEMICAL FEATURES OF SOIL AND RADIOLOGICAL AND MEDICO-BIOLOGICAL PROBLEMS IN AREAS WITH HIGH BACKGROUND RADIOACTIVITY

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There are areas on the globe with highly radioactive formations (rocks, ores, soil, water), caused accumulation of U-238, Th-232, decay them products and isotope K-40. Squares of these regions vary from few km<sup>2</sup> (U and Th mining areas, water sources) to many thousands of km (districts of alkaline and acid igneous rocks: Transbaikal in Russia, the Massif Central in France etc., the soil formed on radioactive rocks: soil of Guangdong province in China, soil of Minas-Gerais State in Brazil, soil of Niue Island, beach sands of Kerala states in India and Azov sea sands).

Specific geochemical halos were formed in the regions with such type of natural formations. These halos can be revealed via the accumulation level of U, Th, and decay products (Ra-226, Rn-222, Rn-220), also via the degree of air ionization, water radiolysis. As a result of increased concentrations of radionuclides the specific biogeochemical province are formed in these areas (the Issyk-Kul province in Kazakhstan, South-Chinese province, Transbaikal province). The elevated contents of natural radionuclides in the soils lead to high concentrations of radon, which, in turn, causes radioecological problems. Scientists have proven negative effects on human health associated with high average doses of radiation. Epidemiological data of cancer morbidity and mortality are available which, however, require very considerate and restrained interpretation. We give an overview on radiogeochemical and mineralogical features of soils in the French Auvergne region and in the South-Chinese Guangdong province performed within 2011-2016 period.

An important evaluation indicator of soil condition is thorium-uranium ratio (fig) [Rikhvanov, 2009]. According to our results on INAA and gamma-spectrometry we indicate that high (>5) thorium-uranium ratio in the soils is typical for areas with the occurrence of thorium-bearing geological formations. It is found in soils of Guangdong province (Th/U in the fractions varies from 4,3 to 9). Reduced thorium-uranium ratio is observed in uranium-bearing soils areas. The soils of the region of Auvergne have low Th/U in the range 1-2,4.

The soil of Guangdong Province and the soil of Auvergne region were studied using instrumental neutron activation analysis in the Nuclear Geochemical Laboratory of Geoecology and Geochemistry Department (made by A.F. Sudyko, an analyst). It was revealed that the average content of Th in soil of Guangdong Province amounts 45,33 g/t, U - 7,04 g/t (according to 7 samples). Particular attention is drawn by the high concentration of rare earth elements in soil of Guangdong Province ( $\Sigma$ TR=134,5 g/t), particularly Ce. As for Auvergne region soil, the operational soil research by the INAA revealed that the content of U in soil amounts 6,44 g/t, but Th - 4,6 g/t.

There is the migration of radioactive elements and accompanying elements, which is carried out by the trophic chains: rocks - soil - water/air - living organisms, observing the laws of migration, scattering, and accumulation. In cases of fairly high concentrations of radioactive elements the negative impacts on biota and humans can be detected. The elevated contents of natural radionuclides in the soils leads to high concentrations of radon, which in turn causes