Hydrogeochemical radiation burden in the ambiance of natural radioaktivity in the hills of Vršac

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During regional hydrogeochemical prospection (500 km2) samples were collected from surface flows, springs, wells andborings. In water, contents of uranium, radium and radon weredetermined. Three anomaly zones of radionuclides in water were identified, and their values vary within the interval: 0.1-166 ppb for U, up to 7 Bq for Ra and 2.8-36 Bq. Risk for cancer incidence was calculated using Monte Carlo techniques. Anomalies of radioactive elements are located in the area which is built of granites, gneiss and crystalline schists. According to the available data it is considered that the granites have intruded in the crystalline schists during hercynian orogeny which is of significance for uranium deposits formation. In the purpose of defining coditions of uranium migration and depositing at favorable geochemical barriers, beside contents of U, Ra and Rn in water, some other parameters (Eh, pH, Ep, content of microelements,etc) were determined. Identification of the areas of hydrogeochemical radiation burden caused by presence of radionuclides (U, Ra, Rn) in water is of special relevance for determination of geopathogene zones of the influence of natural radioactivity. By applying conversation factorsthe radiation burden was calculated for each radionuclide. Research results are shown on maps and charts. That results are representing the influence of natural radionuclides in water, which are ingested in the ambient of living environment of rural settlements.

Keywords:hydrogeochemistry,radioactivity, cancer incidence, uranium, radium, radon.

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Mineral Physics in the Terapascal Regime: Dynamic Studies of Planetary Interiors

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Laser-driven shock wave techniques extend the reach of mineral physics to the terapascal regime, permitting unprecedented studies of planetary compositions. Such experiments probe extreme states of matter characteristic of late-stage giant impacts (such as that believed to have formed the moon) as well as the present-day interiors of several Earth-mass exoplanets. Here, I present a suite of recent results on the physical and transport properties of fundamental mineral phases in the Earth's mantle: SiO_2, MgO and $MgSiO_3$. Experiments on molten $MgSiO_3$ show the first evidence of a liquid-liquid phase transition with a 6% volume reduction over a wide temperature range, suggesting the potential for unexpectedly complex behavior in silicate liquids at ultra-high pressure. Results on MgO resolve controversial predictions for high-pressure melting and the B1-B2 transition. In addition, data for all three materials reveal thermal and electrical conductivities enhanced by one to two orders of magnitude in the fluid state relative to estimates for the present-day terrestrial mantle. These results underscore the potentially significant role of conductive liquid silicates and oxides in governing the early thermal-chemical evolution of the Earth and other extra-solar 'rocky' planets.

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