
The concept of a two-layer geochemical structure of modern biogeochemical provinces as a theoretic basis and a tool in spatial eco-geochemical health risk assessments

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Abstract

Geochemical structure of modern biogeochemical provinces is proposed to be considered as two-layer, each layer being of different genetic origin and organization. The basic natural structure has been formed in the cause of the biosphere evolution and is noted for a dynamic zonal, regional and local hierarchical organization resulting from interaction of living organisms with the environment. Since mechanism of the struggle for life demanded survival of only those species and individuals that were able to survive, adapt and transform the environment for the most effective interaction with the media, the natural structure of biosphere should be ideal for all the survived cenoses. This "ideal" geochemical structure may be followed in the structure of soil cover as a product of the long-term interaction and the most suitable habitat for the existing biogeocenoses. Appearance of *Homo sapiens* as a species with a unique competition strength due to cephalization enabled human colonization and survival in areas with unfavorable geochemical conditions causing site-specific natural endemic diseases among people and domestic animals such as endemic goiter, fluorosis, etc. On the other hand, the development of agriculture and industry caused environmental contamination that covers the natural substrate as a new layer of chemical elements and compounds of anthropogenic origin. Due to specific spatial organization, the variation of existing health risks can be analyzed as superposition of the natural and anthropogenic structures. The proposed concept has been verified on example of modern iodine biogeochemical provinces within the area of the Chernobyl radioiodine contamination zone.

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