



## **Non-linear character of redistribution of chemical elements in the Earth's global systems of different physical state as a result of biogenic activity**

Vyacheslav Korzh

A comparison of the mean chemical elementary composition on the global systems of different physical state (the Earth's hydrosphere, lithosphere, and atmosphere, [1-4]) enabled to reveal a non-linear character of redistribution of different elements between these systems. The established general feature is that with the decrease of the global abundance of the element its concentration in the solid phase is relatively increasing as compared to liquid or gaseous phase. The process is most active at the so-called biogeochemical barriers abundant in life and is therefore inferred to result from the geologic activity of the ubiquitous living species regulating their environment. The calculated index of non-linearity ( $\nu$ ) exhibits definite stability between the compared systems approximating: 0.7 (for proto-lithosphere - sediment system  $\nu = 0.75$ ; for river - ocean system  $\nu = 0.67$ ; for ocean - atmosphere system  $\nu = 0.7$ ). The obtained value is believed to present a universal constant of biosphere reflecting biogenic redistribution of chemical elements in the course of its evolution and corresponds to the biosphere concept of V.I. Vernadsky [5]. The obtained values may be used in estimations of the biosphere stability and anthropogenic transformation of the Earth's systems on the global scale including biogeochemical cycles and soil cover.

### References.

1. Bruland K.W., Lohan M.C., 2004. Controls of trace metals in seawater. *Treatise of geochemistry* (Eds. H.D. Holland, K.K. Turekian), Amsterdam et al.: Elsevier, Vol 6, 23-47.
2. Knyazeva H., 1999. The Synergetic Principles of Nonlinear Thinking // *World Futures*. Vol 54, No 2, 163-181.
3. Korzh V.D., 1974. Some general laws governing the turnover of substance within the ocean-atmosphere-continent-ocean cycle. // *Journal de Recherches Atmospheriques*. France. Vol 8, No 3-4, 653-660.
4. Korzh V.D., 2003. Specificity of Formation of the Biosphere Elemental Composition// *Doklady AN SSSR*, Vol 392, No 4, 517-520 (in Russian).
5. Vernadsky V.I., 1994. *Living Matter and Biosphere*. Moscow, Nauka, 672 p. (in Russian).