



## The System of Chemical Elements Distribution in the Hydrosphere

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The chemical composition of the hydrosphere is a result of substance migration and transformation on lithosphere-river, river-sea, and ocean-atmosphere boundaries. The chemical elements composition of oceanic water is a fundamental multi-dimensional constant for our planet. Detailed studies revealed three types of chemical element distribution in the ocean: 1) Conservative: concentration normalized to salinity is the constant in space and time; 2) Nutrient-type: element concentration in the surface waters decreases due to the biosphere consumption; and 3) Litho-generative: complex character of distribution of elements, which enter the ocean with the river runoff and interred almost entirely in sediments. The correlation between the chemical elements compositions of the river and oceanic water is high ( $r = 0.94$ ). We conclude that biogeochemical features of each chemical element are determined by the relationship between its average concentration in the ocean and the intensity of its migration through hydrosphere boundary zones. In our presentation, we shall show intensities of global migration and average concentrations in the ocean in the coordinates  $\lg C - \lg [\tau]$ , where  $C$  is an average element concentration and  $[\tau]$  is its residence time in the ocean. We have derived a relationship between three main geochemical parameters of the dissolved forms of chemical elements in the hydrosphere: 1) average concentration in the ocean, 2) average concentration in the river runoff and 3) the type of distribution in oceanic water. Using knowledge of two of these parameters, it allows gaining theoretical knowledge of the third.

The System covers all chemical elements for the entire range of observed concentrations. It even allows to predict the values of the annual river transport of dissolved Be, C, N, Ge, Tl, Re, to refine such estimates for P, V, Zn, Br, I, and to determine the character of distribution in the ocean for Au and U. Furthermore, the System allowed estimating natural (unaffected by anthropogenic influence) mean concentrations of elements in the river runoff and using them as ecological reference data. Finally, due to the long response time of the ocean, the mean concentrations of elements and patterns of their distribution in the ocean can be used to determine pre-techno-generative concentrations of elements in the river runoff. In our presentation, we shall show several examples of implementation of the System for studying the sediments' transport by the rivers of the Arctic slope of Northern Eurasia.

### References

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