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TITLE: Some General Laws of Chemical Elements Composition Dynamics in the Hydrosphere

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ABSTRACT BODY: The biophysical oceanic composition is a result of substance migration and transformation on river-sea and ocean- atmosphere boundaries. Chemical composition of oceanic water 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 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 (Fig. 1). The correlation between the chemical compositions of the river and oceanic water is high ($r = 0.94$). We conclude that biogeochemical features each element are determined by the relationship between its average concentration in the ocean and the intensity of its migration through hydrosphere boundary zones. In Fig.1 we 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 τ is its residual time in the ocean. Fig. 1 shows 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 to estimate natural (unaffected by anthropogenic influence) mean concentrations of elements in the river runoff and use 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-technogenic concentrations of elements in the river runoff. An example of such studies for the Northern Eurasia Arctic Rivers will be presented at the conference.

References

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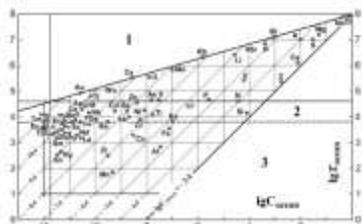


Fig.1. The System of chemical elements distribution in the hydrosphere. Types of distribution in the ocean: 1) conservative; 2) nutrient-type; 3) litho-generative.