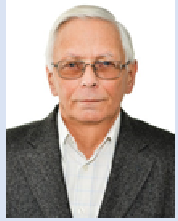


Non-linear character of redistribution of chemical elements in the biosphere components as a result of the living matter activity

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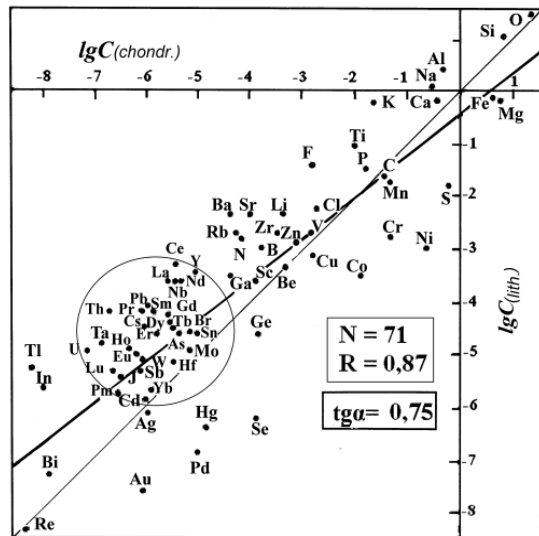
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INTRODUCTION

A key moment in the study of the specifics of the formation of the elemental composition of the biosphere is the determination of the laws of redistribution and balance of flows of average concentrations of chemical elements between different phases, such as a solid - liquid (lithosphere - hydrosphere), which occurs as a result of continuous processing of inert matter by living organisms.

Our task was to investigate this process in the "lithosphere – hydrosphere" system, taking into account the involvement of "living matter" as its main active creator.



Comparison of the average chemical elemental composition in global systems of different physical states (the hydrosphere and lithosphere of the Earth) revealed a nonlinear character of the redistribution of the dissolved and insoluble state of various elements between these systems.

It is established that redistribution of elements between global systems of different physical states leads to a general relative increase in the concentration of trace elements in the environment of "living matter".

This process running in various natural systems has practically the same parameter of nonlinearity approximately equal to 0.7.

For (proto-lithosphere (stony meteorites) - the "living matter"- lithosphere) system, the non-linearity index is 0,75 (Fig 1). For (river – "living matter" – ocean) system non-linearity index is 0.67 (Fig 2); for (ocean – "living matter" – atmosphere) system $v=0.7$ (Fig 2).

For the current level of awareness, these differences in non-linearity are practically negligible.

Thus, the existence of a universal indicator of nonlinearity in the evolution of the elemental composition of the biosphere was proved for the first time and its quantitative assessment was carried out.

RESULTS

CONCLUSION

The general law of the redistribution of chemical elements in the global systems of the Earth is established, namely, that living matter reacts very energetically to a deficiency of trace elements on the surface of the planet. The lack of concentration of chemical elements is overcome by the purposeful work of "living matter", which, acting in concert as an integrity system, turns chemical elements from insoluble to soluble in the hydrosphere and from soluble to insoluble when the environment is soil. Most actively, this process occurs in the so-called biogeochemical barriers "ocean-atmosphere" and "river-sea", that is, in places of concentration of "living matter". The intensity of the transport of trace elements in the ocean-atmosphere-continent-ocean system exceeds orders of magnitude the intensity of the transport of chemical elements contained in sea water in macro concentrations (Cl, Na, Mg, Ca). The nonlinearity index of biogeochemical processes obtained by the author is a universal constant that reflects the law of biogenic redistribution of chemical elements in the biosphere during its evolution. This corresponds to the biosphere concept of V.I.Vernadsky's. This constant can be used to assess the stability of the biosphere to the anthropogenic transformation of terrestrial systems on a global scale, including the biogeochemical cycles of the hydrosphere and soil cover.

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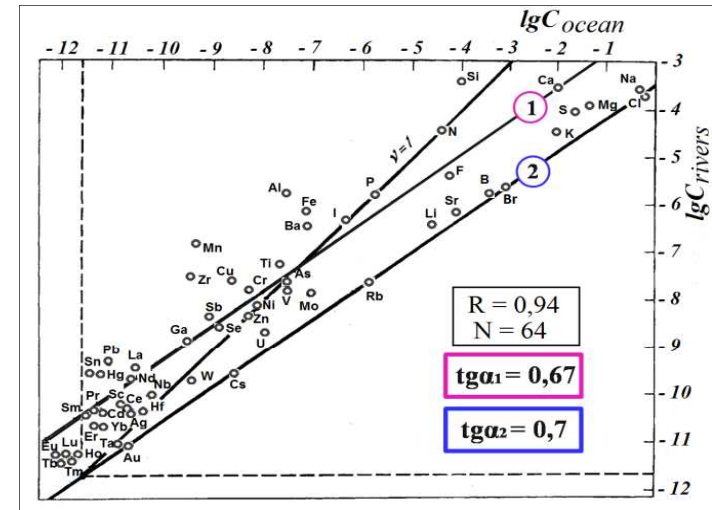


Fig.2 Relation between elements' average concentrations in the ocean and river flow

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