

Interrelation of geosystem formative factors at the biosphere level

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Land cover is a term widely used during last decade in world practice mean reflection of earth surface biophysical properties through multispectral remote sensing systems and imaging its condition in semantically clear units which regard to vegetation, soil, bogs, open water, land use condition etc. This term is certainly close to landscape but the difference is that land cover oriented to properties observed and measured by remote sensing means. Term landscape in any interpretation is connected with models of spatial-temporal dynamics of processes which form earth landscapes. Term landscape cover in this context is projection of observed and measured properties of landscape cover (geosphere) to earth surface in various scales and directly reflecting primary properties of biosphere. The latter fact is determined by leading role of remote sensing data in landscape cover research. The most important functional property of biosphere, its biological productivity – reflected by normalized difference vegetation index (NDVI). The seasonal change of index is widely used in creating global maps of landscape cover – e.g. Land Cover Map 2000, Department for Environment, Food and Rural Affairs, NASA's Terra Satellite Refines Map of Global Land Cover, NASA's Earth Observatory etc. It is clear that spatial variation of biological productivity and land cover structure are functions of climatic variables, surface elevation and its morphometric properties, and soil forming rocks. The contribution of this variables to biological productivity can be various and non-additive. Detaching of integral factors which determine spatial variation of biosphere properties can improve understanding of its functioning. Hypothesis of univocal ratio of biosphere features and external variables is correct only for equilibrium conditions of whole global system. There is good reason to believe that inertia of vegetation types can affect equilibrium relation with rapidly changing climate. The degree of this affect can be assessed.

Grid maps with 0.5° x 0.5° resolution of NDVI, NPP, vegetation cover, climate and relief (New, 2002, ISLSCP, 2004) allow to realize this assessment. Besides soil databases (FAO) allow to assess terrestrial carbon stock. Additionally, soil databases (FAO) allow to assess carbon stock for terrestrial points all over the world. Using ratio of biological productivity, climate and relief variables and carbon stock we assess important parameters of carbon circle in terrestrial biosphere. We also found reliable data about carbon stock of Russia bogs and included them into analysis.

Linear relations of hydrothermal mode (eight types of variables), NDVI, relief (four variables), seasonal and permafrost, NPP have been decomposed by factor analysis. Six external factors determined which influence general characteristic of biosphere - NPP ($R^2=88\%$). We also illustrate in our report factor basis of soil carbon stock and bogging processes in northern hemisphere. We consider the degree of equilibrium between landscape cover types and external variables. On this basis we determine areas with non-equilibrium state (approx 20% of dry land) which are expected to rapidly modify its land cover.

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