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## THE GEOWORLD AND ITS REFLECTION IN THE DAYTIME SURFACE STRUCTURE

*key words:* landscape, Geoworld, landscape structure, perception of landscape

### THE GEOWORLD

Before asking the main question I permit myself to consider some fundamental questions that are important from author's point of view. We possibly live in the most interesting and in the same time in most intricate part of the Universe that can be named as the **Geoworld** (in our perception). It's very difficult to research and describe it as this part of the Universe because, firstly, of the colossal diversity of different processes and structures including men with their activity but also we as the observers are included in it. That fact demands to take into account our own feature of surrounding perception and forms our picture of the World. So we must understand our own nature well enough, even more as the mankind have been on the leading point of world evolutionary process for the last milleniums. It's signified that the mankind appears not only as phenomena of reflection and knowledge but also as phenomena that determines the progressive move of Universe as a whole. It turned out, that exactly men are able to reveal the deep layers of Universe organization such as informational and inner aspects and to use it for culture forming as nonmaterial "artificial" environment, as the form of opposition to chaos.

The Universe for us is shown as the World that means that this World is nothing else but some pattern that we form from the informational flow in our mind. I think this fact is very significant: we form our **picture of world** only as some **cognitive surface** – the pattern or image - but not anything else, and its structure is formed by system of our notions that undergo gradual or uneven changes. This frontal surface is the cognition front that sometimes looks as active or passive and stable or unstable. Its dynamic is always determined by cognitive situation, by its tension i. e. by

ratio between inside world picture (our inside World) and reality. In that case some questions appear. In what degree our inside world is corresponding with reality? Why we can't percept and cognize our surround as it is? What is a nature of information and how is it selected for designing of our conceptions and their transformation? Such questions are very important for geographies, as we have to do with more complex part of Universe, adequate reflection of which must be made on some different levels. How it will be shown below, such peculiarity inhered not only for man but also is the fundamental feature of the Universe in whole. Its basis constitutes of inaccuracy of our perception, absence of reciprocal monosemantic (one-to-one) conformity as the result of interaction between more or less organized unites of different nature. Some more causes are delayed of relaxation process time, increasing with arising of organizational level system as well as complexity that leads to synchronization decrees in the absence of forward reflection apparatus with the prediction function. We have the situation characterized by continual presence of non-coordination. All this leads to inner non-equilibrium of the Universe that in one part is determined as possibility of its evolution and the energy and substance only display something deeper similar to the organization wave function. It may be said that the Universe itself is latent from us and we can observe only its "face" as communication phenomena – its projection on the **communicative surface**. On the contact surfaces of different synergetic unites we have the communication process that leads out on the first place the phenomenon of information. So we must take into consideration not only physical (mechanical) processes that are realized by physical machine but also informational processes that are realized by informational machine with leading function of uncertainty situation decreasing.

#### **WHAT IS THE CAUSE OF DEVELOPMENT?**

So in the base of development we find some distinctions and medium that can provide a contact interaction between different parts of the space. Such situation is a consequence of symmetry breach that stimulates appearance of stream. This state is known as non-equilibrium. Its affect increases with growing step of its expression: with increase of this step the stream becomes more and more intensive that forms new conditions for far symmetry breach and complication of situation in whole right up to the chaotic regime creation. But such regimes are also the mechanism of information production that lead to the way of communication development, birth of languages and senses. The Universe finds in itself the special dimension – informational-semantic one that becomes the base of circular communication that takes it **cognitive phenomena**. So information is the consequence of perception inaccuracy and of the Laplace's determinism absence.

The major feature of the Universe is possibility of individual object appearance that occurs thanks to different relative isolating processes. In determined conditions the self-organization processes that lead to appearance of individual integrity objects become apparent. Self-organization can be considered as process aggregate that offers by the way of entering in totality that is showing the tendency of combination and self-coordination. The constituents are supported, taking each other positively thanks to sheaf of maintenance or rejected each other in the integrity. As a result we have integrity as a complicate-organized multilevel clot of the Universe that has the deeper background. It means that unities are formed first of all on the base of harmonized complementary relations. Such integrity is continuously extracting potential possibilities from the matter. It is the evolutionary-synergetic phenomena i. e. in addition to purely "physical" processes it is based on informational processes. Thanks to such processes the Universe has the "face" that we name the "World". With time this «face» becomes more and more complex and at last includes the features of Geoworld and then the human "face" in the form of culture. This part of the Universe is the most complicated and just such World allows man existence with possibility to get to know and seek to change it.

Now let's give two or more different objects that we will consider as more or less stable organization clots founded on the base of more strong synchronization and inner communicative insularity. It's considered that system components don't interact with medium directly but only with the aid of common surface that presents a system as a whole. It means that elements of such surface must be characterized by higher sensibility and, accordingly, depressed stability. Such objects are in the contact with other ones but this contact is never full. Each of contact objects is pressed towards self-conservation that demands from it continuous making of medium state estimation and own state as well as its correlation. Just here the problem of limited precision percept appears that demands to consider it in more details. There are some interesting moments. First consists in that a perception and pattern forming follows it in principle isn't based on the one-to-one mapping as such reflection doesn't generate an information inasmuch as it signify a simple transfer. I think it's connected with the limit of percept exactness and is peculiar for all Universe levels. On the quantum one it is based on the Max Planck's constant. It's known that in quantum mechanics in contrast to classical notion about persistent phase trajectory that describes the evolution of physical system's state, the Heisenberg's principle of uncertainty determines the limits of different states distinguishes. On the macro-system level the reason of such phenomena is in the limit of system resolving ability. So such reflection a priori contains some errors and as it was show by Henry

Poincare a little error in time is increasing. For dissipate systems originally closed points are diverged in accordance with exponential law.

Here we have one more problem: the state expression that we observe on the system surface is an integrate value of its real inner state, i. e. it's its projection on the contact surface that may be recognized by another system accordingly to its possibility to identify. And what is more important the values on the surface are essentially changing by its activity. It means that the state of full self-coordination may not be reached. This is applied to purely "physical" side of relationship. But on the symbolic level we also collide with such problem. It means that we reflect our environment ambiguity and just this makes possible the Universe existence and as well as phenomena of man with his cognitive ability. All clots of the Universe are in the communicative relations and interpret them using the language of own dynamic. Everyone percepts in one's own way so each individual "point of view" determines an individual way of development.

It's one more important peculiarity that makes possible the Universe local development. It is a question of relaxation time, which is determined by system complexity and its organization level. At growing of the complexity and level of system organization the relaxation process time will be increasing. This is determined by presence of complicated mechanisms of state stabilization. It may be said about "mass of organization", that makes system steadier: system is resisting to changes. We have a situation when impact pass from structure and its effect becomes apparent after the lapse of some time. But during this time situation continuously changes that leads to increase of discrepancy: a system accumulates errors. With increasing of difference between real state and fully adequate state the passage will be more and more spasmodic, nonlinear and nonpredictable (abrupt). But what is followed from such peculiarity of the Universe? So we have situation that is characterized by unequal system states and this signifies that the situation in principle cannot be stable. Each individual part of Universe will be constantly aimed to state maximum of conformity that also continuously changes but never reaches it. We can conclude that the World is doomed to communication and this is the base of progressive motion.

In connection with this the author (fig. 1) offered the conception of destruction-construction cycles. In some systems under the influence of outside influences and inside fluctuations multitude processes of structure destruction takes place and in the same time they constantly move to some optimal state. The first of them may be earthquakes, heavy showers, droughts, floods, conflagrations, excessive trample down and eat away, mud-and-stone flow, consequences of human activity and many others. But many inner dynamic consequences that disturbs the structure take place,

too, especially on the biotized and anthropotized levels, for example, rocks fatigue, soils fatigue, similar events in economic and political life and so on. Such dynamic may be considered as way of protection systems against cycling that allows accommodating for changing, emerging in outside medium. And what is more interesting such dynamic may be considered as inner activity of systems. The meandering is a good example: this lead to paring of steeps slopes and activity of erosion processes in whole fluvial basin with function of it expansion.

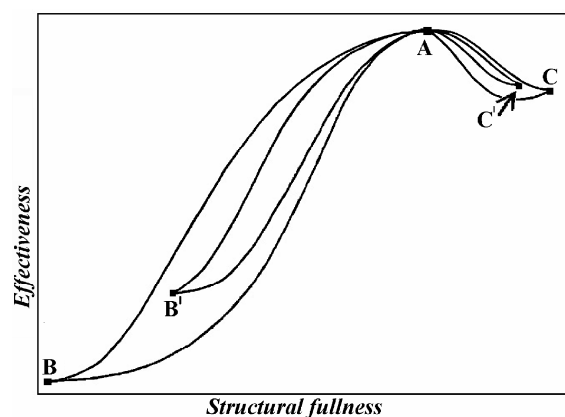


Fig. 1. The destruction-construction cycles: A – quasi-terminal state, B - different destruction states, C – states with supersaturating and depressed effectiveness.

In this conception we have two variants: with depressed structure that functional reduction and stability lowering stimulates (points B), with structure supersaturating and depressed effectiveness, that also leads to stability lowering because of random growth. But earlier it was another conception named as self-organization criticality (Bak, Chan, 1991). The basic idea is that system generates the avalanches of crash itself by the way of inner dynamic. As turns

out such mechanism is universal and peculiar to systems of the very different nature including formation and functioning of biosphere and social-economic phenomenon.

### Geospace and Geosystem: the basic Geography notions

Now consider the question about the object of geographical research. The problem of the notions system is utterly important. The notion about symmetry will be used as the basic one. Different fields of knowledge deal with correspondent part of the World that is characterized by different symmetry breaches. Just symmetry breach allows forming the notions about space and time. So this notions are the result of human cultural development and nothing another. We can say about Solar system's space, Earth space and so on. Earth space was formed by process of substance differentiation in the earth gravitation field and, in contrast to general point of view includes lithosphere, hydrosphere and atmosphere that are only the condition of Geospace formation. Fundamental feature of Earth space presents spherical symmetry. They aren't the objects of Geography. As to passage to Geospace this spherical

symmetry must be disturbed. So we can define the Geospace as the part of Earth space (within lithosphere, hydrosphere and atmosphere) where the spherical symmetry loss takes place. Must be something that realizes this process. I think it's the geographical machine named as **Geosystem**. It's the single whole that is acting within Geospace i. e. Geospace is the part of the Earth space.

Geosystem may be determined in different ways. In more whole variant it's the global regime that reproduces the asymmetry of Geospace. In other variant this is the interlacing net of multitude actions (elementary processes) of the very different nature that are organized in united process in which inner and outside communication plays an important part. Next variant – it is the totality of correlated substances circulating that form some structures of active surfaces named as **Geocomplex**. In that case Geosystem looks as functional-morphologic totality and Geocomplex is nothing else but selected structure: **the morphology is the stark system dynamic**. Geocomplex belongs to Geosystem and being formed by it begins to determine, to fasten the dynamic regimes. Therefore Geosystem isn't three-dimensional object but its geometry is very intricate that is realized in the three-dimensional space. It is clear that under outside conditions changes Geosystem as the whole is divided on numerous local regimes of different scales and organizational levels main of which are mineral, biotized and anthropotized. The passages between these regimes are clear rarely and the scopes are not well-expressed. Each individual regime may be offered as packed co-ordinated processes that form nets of successive series. Such packed will be gradually changing after changing of medium that may be represented as the set of **control parameters**. Its action is reflected on the dynamic regimes by way of **order parameter** selection. With increasing of complexity and organisation level rises the number of possible states where Geosystem realizes its action. Here some principles of structure transformation action.

So Geosystem is the united process that is divided into many different regimes. Zones with chaotic regimes that act as glue connecting stable regimes with each other. But a process is the movement from the difference. One interesting question appears in this connection: what difference is it in our case about? I think they are the organizational levels. We deal with the integrity process named as **Geoprocess** as the motion across the mediums with different informational satiety. Under such consideration majority of informational aspects become particularly important.

It's necessary to note that the daytime surface is the most active surface in the whole Geocomplex structure. At the same time it is the visual surface. So the structure of this surface must include something that is connected with geosystem action, namely the **markings** of its action. We can say that geosystem is drawing the design on the daytime surface or writing the text. It serves by the display that realizes

communication function. In that case the daytime surface is the geosystem “face” which organization of drawing reflects (mappings) the organization of Geosystem action. From author’s point of view this organization of picture that we can uncover is necessary to name “landscape”. But we cannot uncover this organization in full measure. And what is more each of us perceives it in his own manner, so each individual point of view is an addition to others. Each occasion we get is only one side of the whole connected with each of us. Hence a latent structure takes place that demands to name it. I propose such name as “**ontolandscape**”. This latent pattern reflects the state (regime) of geomedium within some more or less limited territory that is named as “**locality**”. In this case a locality is nothing else but **landscape-generative area of daytime surface**. It’s not the hierarchical classifying unit.

Any geosystem regime may be described on two complemented levels: physical and informational ones. First is connected with the mass-energetic flow over that determined by laws of energy and substrate conservation. On this level we must consider the geosystem regimes as physical machine. The base of such description makes up the balance and differential equations. But such description doesn’t reflect more complex question, first of all connected with the geodiversity and organization of different dynamic regimes and structures. So we must consider this problem from other point of view: for instance evolutionary-synergetic conception, the major aspect of which is the informational one by the way of analyzing this dynamic as the **informational machine**. The system’s frame has hierarchical structure in which different elements are treated to different hierarchical levels. The elements of lower levels are less stable and are characterized by continual fluctuations. In the conditions when action of positive feedback becomes more expressive the fluctuation intensifies and this elements begin to “tremble”. Such “tremble” is necessary to consider as one of the informational machine action that in determine period of time makes it act more active. But reinforcement of negative feedback leads to stabilization of structure and lowering of fluctuation. The environment introduces its contribution, too. Such machine may be determined as the whole of dynamic regimes with the appropriate circuit realization elements connected with it. The aim of informational machine action is decreasing of situation uncertainty. It means that on it outlet the uncertainty must be less than on its entry. As it is found the major significance has the chaotic regimes. The presence of chaos is connected with necessity of reliable information processing. In order to function in regime of informational machine the Geosystem’s state must be inwardly active. On different organization levels such mechanisms are different. For example in fluvial basin they are presented by meandering river, on the biogeocenose level it may become apparent as the soil weariness, similar phenomena is presented on the anthropotized level (political and

economical weariness or satiety) and so on. In the most degree the informational machine action is developed within **geofronts** that connects the regions with essentially different regimes characteristics. There are the narrow zones with sizeable potential differences.

Presence of two descriptions of scientific levels assumes two correspondent geographical ways named as Physical Geography and Informational Geography.

According to Physical Geography considered by author it's not a traditional variant. It's the common description level for all variants of geosystem regimes irrespective of organization level, the aim of which is the description of different phenomenon of geographical complexity level from the physical point of view. It's clear that another way – informational – is the research and describes the same phenomenon but from the informational process aspect. At such notions as “natural geoinformational system” (N-GIS) and “informational machine” are used. The central questions are following: how the system decides the issue about state selection in conditions of many different influences and how this dynamic reflects in the daytime surface structure. The computer GIS (C-GIS) considers as the method of geographical modelling and now such methodology is found only in the conceptual stage of development. At last in our time we may speak about integration of these two levels and the new methodology – evolutionary-synergetic one.

## **GEOSPACE FORMATION AND ITS MODERN STRUCTURE**

We must understand that Geoworld we reveal today passed a long formation period and inasmuch as we can say that it has dealt with dissipate medium: at that its formation was evolutionary directional. In compliance with principles of organization each of the next levels is more complicate and more spot. But in all cases maximum action is concentrated near vicinity of active surfaces. It means that geospheres are not solid but, if it may be said, openwork. It may be better to choose zones of active and passive current of process and that fact concerns all spheres. Such organization is circumboundary. The nowadays structure of Geospace is displayed on fig. 2. Here we have some levels through which the geomedium passed. It is **mineral Geosphere** (researched by Geomorphology), biosphere (researched by Biogeography), anthroposphere (researched by Anthropogeography but not so-called socio-economic geography for existing of which there aren't bases) that in its turn concludes the agrosphere, the technosphere, the noosphere and urbosphere. This process of forming is completed by appearance of the divosphere (will be researched by Divogeography). Each of the next spheres is formed within the more early ones that gradually get involved between them and form total Geosphere. Such



process always run by taking the brood of conflict situation but with the time the coordination is reached. Let's consider it in order of appearance.

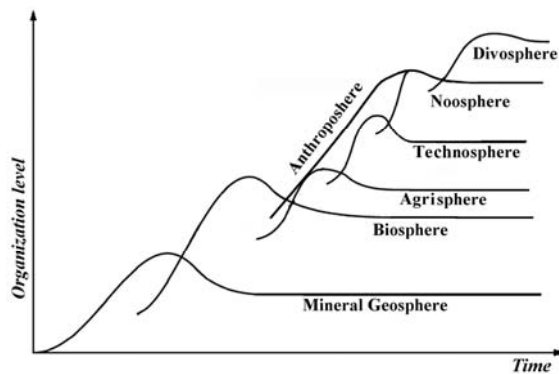


Fig. 2. The geospace modern structure.

### Mineral Geosphere

It's the first one that was formed and it is relatively simple. Its base makes up the mineral geosystem regimes. We have some based processes that include realized material circulation. This dynamic includes "endogenous" and "exogenous" ones though such division is conventional i. e. for geosystem both variants are inner.

Majors of the "exogenous" are weathering, denudation (including

dilution), transportation and accumulation that are divided on many concrete processes. There is some transportation mediums that together with weathering complete the "exogenous" branch of geocycle. After G. Simonov there are next transportation mediums: water-ionic, water-ground, ground, air-ground, ice-ground, snow-ground (Simonov, 1966). The whole processes that develop within it form the exomorpho-dynamical sphere in contrast to endomorphodynamical sphere with its multitude processes. Near the Earth surface these two spheres are colliding and form united well-ordered layer.

In spite of relative simplicity the dynamic on the mineral levels is complicated enough. Actions of different processes are colliding that often create complex picture. Presence of complicated combination of different conditions leads to uncertain manifestation and to necessity of informational machine action. The functioning of fluvial systems is a good example. It is well-known that such objects are characterized by presence of fractal structure and in the process of formation passed some stages that allow to speak about real evolution. Self-organization of water-ground current takes place when the fluvial system has aspire to such structure, which allows maximum stability, minimize energetic debit and maximize carrying capacity. Each of fluvial basins forms its own potential by deep erosion and competes for territory. We can see this as on the level of single linear current with its erosion form, just on the level of fluvial net. Even here the possibility of medium changing by the way of substance resedimentation takes place. For the example we can use the data from work of American geomorphologist that researched the behavior of the fluvial

system in the chute (Schumm, Mosley, Weaver, 1987). In the constant environment the fluvial structure at first unwinds and then reaches its maximum, becomes simpler above all owing to diminution of waterways of earliest orders. In that way the topology of all fluvial system is changing. But such dynamic variants may be realized only in the artificial medium. In the nature conditions changing of medium demands from the system the informational machine action and accordingly presence of higher number of small waterways. This means that at least part of the fluvial system is in the constant state of self-organized criticality. This is the state of the wake. Such systems are cognitive i. e. produce an information, though it doesn't know about this. It has the "face" in the form of valley with the well-expressed drawing organization named as valley landscapes. The character of this drawing say to us about order of waterway, its age and dynamical processes in the space of its basin that allows to uncover its state. Such position is **physiognomical** and physiographical corresponding description.

### **Biosphere**

It is the second organization level after mineral geosphere that was formed within it. It is the part of Geospace where biotized geosystem regimes act. Biosphere becomes apparent with living organisms originating that selects the essential substances and encloses it in the biogeochemical circulation. We can consider the multitude of these organisms as the very complicated channel of substance and energy passing (current) that are self-recurred constantly and have an inner mechanism of changing. And so it needs to consider their associations as the whole passing channel, which morphology has changed depending on changing conditions in time and space. The natural evolution is process based on the random changing on the genetic level but there are some aims that reveal in it on the common level. There is an increasing of biodiversity, complementary relation in biocenosis, stability on the total level and development of the intellect assigned for the information processing on the symbolic level. We can say that such evolution is directional to man's appearance.

The major peculiarity of living organisms is its feature-changing environment in direction of its stabilization in limited diapason. On the topic level take place the soil formation with the function of vitals elements and water concentration as well as the condition of soil microorganisms and funguses existing. The soil isn't the all-sufficient formation but is in close connection with plant cover. Together they form the indissoluble complementary unity. The diversity of plants leads to forming and standing maintenance of inner nonequilibrium that makes soil active medium. It needs to note that soil doesn't combine with mineral components, humus and living organisms but this is firstly the complicated organization of many cyclical processes

i. e. it is presumably hypercycle – global form of organization that has the feature of selection. Because of this we cannot see the soil. We can see only its “face” – soil profile.

The principle feature of living organisms is its organization in ecosystems. I think that the ecosystem isn't the well-ordered multitude of organisms but the organization of definite complementary functions that support the steady circulation of chemical elements. It's impossible to see ecosystem. It is shown as in the form of biocenose – association of living organisms that is its “face”. It is important to understand that it's not organisms themselves or its aggregate but the totality of determined functions based on the ratio of its living forms. Ecosystem is the regulator of the biotized geosystem regimes and gets to know through the interaction between species populations. This complicated dynamic is reflected in the space structure of phytocenosis that may be more or less regular. We can reveal its districts with chaotic allocation of species that “sew”, “stick” together more stable ones. Such zones appear as the result of inner dynamic. The same function carries out the eco-tones. But within them one another function is located namely informational machines. It's possibly the most interesting situation takes place in zone where two or more variants may exist, for instance zone of the forest-steppe. Here we have complementary structure that is characterized by high level of stability. In such system not competition is the leading process but accumulation of pathogens that leads to effect of soil tiredness that disturb the biocenosis stability. The differences between temps of pathogen accumulation in soil by different plants with respect to their diffusion become the factors that lead to symmetry disorder and maintenance of biodiversity. J.N. Klironomos (2002) showed it well. And always we have the organization like ecosystem – the combination of complementary functions the base of which makes up the constant flow of protozoa.

### **Anrtroposphere**

Appearance of man had an exceptional significance for development of the Geospace above all because of his cognitive possibility based on imagination and lingual forms of reflection including abstract thinking. Owing to this features man enters into theoretical relation with the Nature with its abstraction level – notion systems. With the man appearance begins setting in the artificial medium – culture determined as an organization of selected behavior regimes or goal-seeking changing nature as the form of opposition to chaos. Partly culture becomes apparent in the material culture. I want to underline that the culture is nothing else but selected diversity, which reproduce is possible only at the breach with nature environment. Relation between natural and artificial above all applies chaos. If for natural system chaos is the form of connection between existent regimes as well as the states that

success one after another that provide the dynamical continuity, artificial system may not withstand destroyed chaos action. It determines the regularity of human activity in the process of culture forming. This process always is connected with selection of regular actions. So the culture is nothing else but picked nature. It's always the reduction of the less organized nature process.

The anthroposphere formation passed the number of organization levels (living forms) and this motion is continuing now. Each of them begins from the origin of not connected elementary manifestation with stochastic regime in whole. The matter concerns civilization as a form of relation between men and nature. Each of the next levels becomes more and more spot organized and more independent from the nature that reached by localization of activity and circulation locking. It is a tendency to live and act on the same area that demands elaboration of particular living rules and relation with environment. It was necessary as the organization lowering demand of motion stopping. Common character of development of Geospase in whole as well as its parts consists of hypertrophied extensive stage increasing and then some pressing as the result of their germination one in another. Thus formed the anthroposphere "body" in which little by little stands out the part with cognitive function like living organism. Such evolution is similar to biological evolution. The formation of the new man type occurs with this process – *Homo sapiens civilis*.

**Agrosphere.** Agrarian civilization was the first connected with the productive economy that was forming for a long time. Its beginning was connected with changing of environment conditioned by pastures eat away but spring of this form was originated in the great antiquity and had carried the sporadic character. They were casual events on the local level. Just this activity leads to population explosion but density of population becomes apparent as the important control parameter that determines the origin of **communication field** and division of labour and other different social processes including towns and states appearance. The situation appears when increasing of farms compactness leads to stopping of displacement and finely to passing on the higher organization level. The situation simply presses out part of the whole system on the level that demands better understanding of production and optimization it. It's main that value of information arises. In case of a town we get the new living form that processes the informational current. But it's important that with town appearances the difference of the potentials is forming as one of the major control parameters that stimulates and stabilizes the agrarian process. As the result it's beginning mass entering of landowners in the leading functional regime that act like an odder parameter. Owing to this the agrosphere as the part of the Geospace where agrogeosystem regimes are action, beginning to amplify extensively. Only in our time as result of intensification we may watch some of its

compressions. During the time we have the current with agrarian regime that becomes more and more local and organized and in which different industries become more interrelated and complementary. Further development of the agrarian regimes will be determined by interaction with technosphere and noosphere.

*Technical sphere.* Next one was the machine civilization. Its beginning also had the undigested character but with time such form becomes more and more regular. We have coming-to-be the order out of chaos again. Such process may not be stable. Most likely it carried sporadic character. Commonly we have the same character of development as in previous case. It was originating of the new geosystem regime, the new current – machine production that is characterized by hierarchical structure of industrial units with expressed specialization. The net of industrial enterprises is nothing else but complex canal of passing that is reproducing and improving by men's work. It is important to understand that man in such technical system becomes an appendage to machines that are using his consciousness. Thanks to this the technical sphere stands "individually" that development is coming by inner laws. The major moment in this process is the closing of the matter current that provides more independence from external medium. Such system of production is known as ecological (or green) production. There economy "laws" are demanded that are considered by the author as the organization of production. During some last decades it was possible to watch the process of germination (joining) technosphere in agrosphere that means the formation of the unity techno-agrosphere "body" with leading function of the noosphere forming.

*Noosphere.* I think it's the last big structure unit of the anthroposphere. Its formation is taking place already today. And again we can watch the formation of the new component from the casual events on the local level. From separate elementary units is formed gradually a united communication system and then – the cosmic cognitive anomaly – thinking sphere with the Earth "brain" as the material base that connects all elementary meshes of gibbered intellect. So in the antroposphere "body" happens the symmetry violation, as it takes place in due time within living matter. Owing to noosphere all three parts of Geospace are connected still more and form the common integrated **Geobody**.

*Urbosphere.* In contrast to considered spheres urbosphere was forming as the totality of towns that have different measure and specialization. They interact in a complicated manner forming the net and with time this has become more and more expressed. That means that no anyone town functions but towns net as a whole only. At the same time each of the towns is the totality of the power living current and its "channel" in the form of town infrastructure, its architecture. The living current becomes more intensive with increasing of town size and its functional diversity.

Town is the special form of men existence, the “asphalt civilization” that may be considered as the social-production machine that produces the information of the peculiar urban culture. A town-dweller differs from a countryman radically inasmuch as the town environment is artificial that has an effect essentially on his mode of life. The almost full breach with nature takes place as well as with countryside. In the same time such regular medium is the base of the very complex business, political, scientific, artistic, sport life that often turns out in the turbulent regimes.

### **REGIONALIZATION OF THE ANTHROSPHERE AND CONCEPTION OF STATE “BIOSPHERE”**

It's necessary to consider the finish stage of anthroposphere coming up. We see that on the previous phases it took place powerfully but extensive development that leads to its hypertrophy. Such process may be explained by anthropocentric view on the Nature that may be expressed in the following way: the World exists for a man. Just such understanding was leading to perception of the Nature as the resource for society existing that in the end resulted in well-known global ecological crisis. But in reality this crisis is the men's crisis as man was considered the Nature only from the point of view of his own aims. Taking out of man outside passive nature and separation of laws of social life from the life of the nature was the initial world-vision point of the anthropocentric technocracy in relation to the nature and as the result today ecological tragedies. In the end the anthroposphere was shared on many states. Such organizational form of society based on the rule of the government leading to select a particular man – the state one. But as it becomes clear now the state, as the organization form may not secure the further human development. It leads to situation when selected type of man turns out in evolution blind alley. And what is more the mankind cannot decide the ecological problems inasmuch as each of states has own aims. But it can't be forgotten that the man world is buried in Biosphere that is unity and this unity was disturbed by man's activity. So it's necessary to look for another way of development. The attempts of this already take place in the recent past, for instance the work of the well-known “The Sustainable Development Strategy” or “The Balanced Development Strategy” (it's difficult to imagine such development regime based on balancing of parts). But this document reflects only anthropocentric view on the situation. Moreover between states the consensus in this question may not be reached. So the author has worked another variant – “The Coordinated Development Strategy” that includes some major positions including conception of “Biosphere” Land, conception of anthroposphere regionalization, conception of divosphere. Let's consider it in brief.

*The conception of "Biosphere" Land.* The idea that the biosphere is the united organism over the decades little by little captivated the minds of scientists and politicians. More and more facts evidence that its stable functioning may take place only if it's not parted on many untied fragments. With appearance of the insular equilibrium theory, proposed by R.H. MacArthur and E.O. Wilson, conception of fauns allocation of A. Boucot, conception of biocorridors of G.G. Simpson such as some other important works this problem becomes more clear. So the question about the whole space structures of the biotized space that in condition of considerable human activity may provide the stable functioning of Biosphere as a whole was arisen. The author proposes the conception of "Biosphere" Land where in addition to

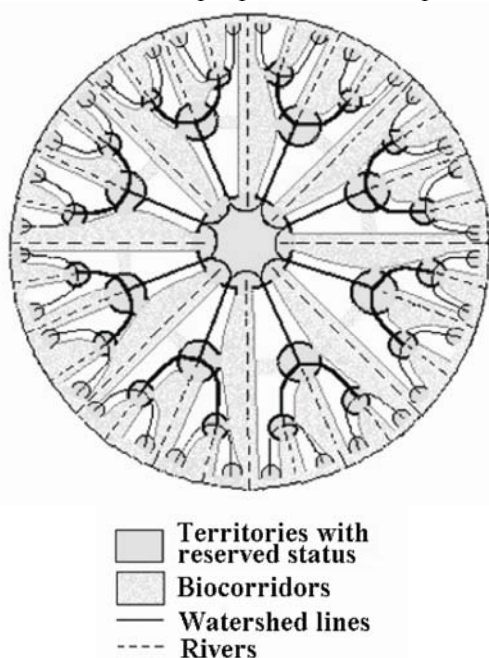


Fig. 3. The structure of "Biosphere" Land.

corridors structure had been determined the structure of territories with reserved states that are tied to environs of rivers beginning i. e. regions of watersheds bifurcation (fig. 3). Area of such territories is more increasing with the river rang grow.

But it's necessary to mark that such "Biosphere" Land structure may not be realized today inasmuch as each state aims own goal and coordination may not be reached in principle. So the decision of this question may be reached only in case of full liquidation of state form especially that state form of organization apparent as the structure that brakes further-more human development. But what may be instead of state?

*Conception of Anthroposphere Regionalization.* I think that in the future global social-economic structure will be connected with development of region manifestations of which we can reveal by now. It forms ignoring states by the way of self-organization that leads to disappearance of the last as the form that becomes in contradiction with further man's evolution. The direction of each region development must be determined by its socium.

Standing of regions is determined by development of great towns – regional centers that generate the activity waves. The significant moment is that such centers are formed within states but development of regional structure has place independently of state borders. Regions gradually become the major “cells” of the global economic system and relations between them by the way of self-organization and destroy the state borders. At the same time a new man forming takes place. It doesn't coincide with administrative unites. As an example may be Kharkiv region that doesn't coincide with Kharkiv administrative district: its southern area has a propensity to nearby Donetskaja district but at the same time parts of Poltavskaja, Sumska-ja, Luganskaja, Belgorodskaja, Kurskaja and Voronegskaja districts are functionally including to Kharkiv region. Just in such composition this region forms one of the biggest and marked real euroregion. A good example also is the regions within the USA that don't coincide with territories of separate states (Fellmann, Getis, Getis, 1997).

The major features of any such region in the future are relative independence based on the new renew energy source, recycling of the technophile materials, developing regional informational center that processes informational current, advancing production infrastructure, educational system and so on. And if on the stage of coming-to-be the competition takes place, with the time it withdraws on the second plan and all the system stands more and more complementary. At that the essential localization of economic action takes place owing to changing of the production structure. For example it will be stepped the armament production, thanks to closing of technophile materials current the amount of products of the extractive industry will take place as well as the thoroughfares owing to flow of traffic decreesing and so on. The question is connected with restoration of natural regimes on considerable areas that arise and that the contact of man with unexplored wilderness will increase. And just this will promote to form the *Homo sapiens divinus*, whose coming will evidence the divosphere formation.

### **Divosphere**

I put this sphere outside of anthroposphere as man on this coincides with development stage culminates a new social-type – *Homo sapiens divinus*. It doesn't signify the appearance of such social type, this signifies that such man becomes to prevail in society. For such a man is typical the intellectual wealth and deep immateriality connection with the unexplored wilderness that on the more early stages is considered mainly as the resource for men existence. It becomes firmly understandable that for the further man evolution it is necessary his being in environment characterized by irregularity and diversity known as the unexplored wilderness. In



contrast to previous period of evolution when the base of culture was forming production, science and art, in the future some new culture will be formed – **geoculture**. It is based on the complementary co-existence with Nature, understanding that the earth world will never be the human organization and that the scientific cognition may not give full understanding. In addition to scientific cognition it must be comprehended as the grip in totality. In such relation to environment the nature perceps more and more as the esthetic value. The nature ceases to interpret as the simple biotope but as the complementary partner with which it's necessary to agree.

And here we discover the significance of beauty. The presence in the Nature of the artistically-esthetic qualities points to reality that exceeds the under review world infinitely and on those ties that existence between the whole and local situation. The beauty is the final aim of Nature move, it is possible with the help of man. It's the manifestation of the inner Logos as the mind of the Nature. The visual Nature is the gigantic brain at which the invisible thought is disappearing that may not reveal on the sensible level: it is seized intuitively. As any brain that estimates and makes a choice the Nature includes the chaos in the local level: the devil hides in details and selects information passing from elementary level to the higher level. A man that builds in the local situation may be not taken in the Whole and perceps the Logos of the World as the whole. It needs to exceed the visible and to amalgamate with the Nature on the mental level. Takes place the return to animistic relation with respect to the Nature of course on the other level.

#### **THE LANDSCAPE AS THE "FACE" OF GEOWORLD**

In contrast to widespread interpretations of the word "landscape" that was spread at last decades the author's point of view is based on its etymological sense as the looks of some locality that is perceived by a person. It means it is necessary to differ the physical surface named by the author the "daytime surface" and its structure, which has some organization in the form of drawing. Just this drawing as a whole is perceived by us and is remembered as a pattern. Just such **organization of daytime surface drawing** I connect with the term "landscape". Landscape is the pattern of some location and this location is the landscape-formed fragment of the daytime surface. It can be shown on the different scale levels – micro-, meso- or macro- but we always must differ the fragment with more or less informatively saturated, accomplished configuration. A relief and a man's face are similar phenomenon. Biological size and character of acting determine however for the most of habitual people some detailed range of scale exists – human scales. All of this says that we cannot represent a landscape on map or photo, we can depict only the daytime surface structure and on this base render it in our consciousness. We give

some form to this structure ourselves and remember it. So landscape is a question and at the same time landscape is an answer.

And what is relief? It is the organic component of landscape. It may be determined as the **organization of the heights field**, or **organization of the topographic notes deviation from the some regular surface**. We can say about relief only if we can attach some form to multitude of roughness. We allot it some forms and percept them. So it's also the pattern that is formed in our consciousness. The perception of relief demands comprehension of all relations between all points in one time. This means that relief can't be determined in one point. We cannot represent relief on the map but we can depict the allocation of altitude notes by different codes such as strokes or isohypses. All of this testifies that landscape and relief may not be divided on any parts, fragments: only physical surface may be analyzed – daytime or topography as well as human face. They are not the sum of their parts: each part has the sense only thanks to its function in the whole. That is why, for instance, relief isn't changing aloud if the corresponding surface transforms i. e. to change the height of all marks that arrange it but keep all of the attitudes between them: the structure of units retains. The speech is about topology steadiness. That also is applied to landscape.

It's interesting for us the descent of such organization. My assumption is that it is the result of Geosystem's action that dints on the daytime surface. Hence we can consider this organization as the projection of Geosystem's action organization on the physical surface. Accordingly the changing in the regimes of such actions must reflect in the structure of the corresponding surface fragment. The daytime surface comes out as display that demonstrates the dynamic, realizes in three-dimensional space on the screen with help of different primitives. The character of their distribution encodes the action. We can't watch the Geosystem's action itself but we can keep a lookout at the changing of the drawing of daytime surface. In such a case we can say that the Geosystem is embroidering some tracery on the surface, or creates some mosaic, on which we put some forms. Just these forms are connected with us in some sense. Our problem is to read this marking with the aim of dynamic organization showing up that it formed. It means that we must decode this drawing and on this informational base shop reproduce the corresponding dynamic. So landscape has the communication function and this fact is the major. In such the way the Geosystem "tells" about its states and changes. But such procedure depends on peculiarities of a recipient inasmuch as each of us percepts this drawing in own way that depends from age, culture, profession, mood, physical state, esthetic fancies, religious faiths and some other moments. The opinion that all see the same isn't correct. We have the case when perception object becomes, if it may be said, **humanly measured**. Each of

individual forms the monad with daytime surface – the indissoluble unity. Just here the subsidiary principle is apparent in the most degree. And what is more we even can't compare our pattern in full measure, as it's not possible to pass our individual vision to other individuals using the tongue. It may pass only the major lineaments, distinguishing features of landscape. In the same time all of this patterns contain many common features that allow us to understand each other. We can say about **psychical relativity of a landscape**.

In the same time we don't percept all of daytime surface structure. Some of harmonies may be expressed not well, other harmonies are covered very small or very vast fragments of surface. There are kinds of particulars that may be uncovered only with another part of spectrum and so on. More over part of the surface structure is related to the least elements in the constant move and isn't stable. Therefore the author proposed the notion «ontolandscape» as a landscape in itself.

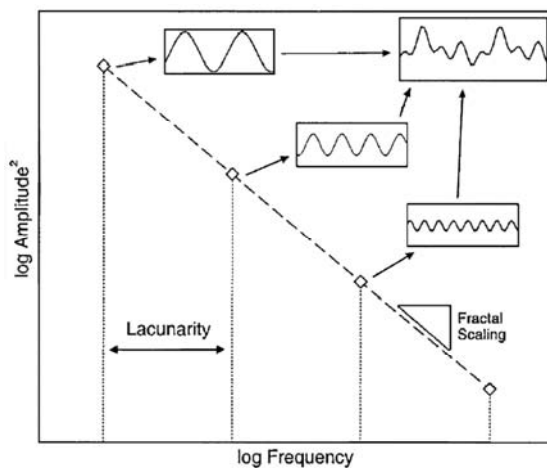
Still one important notion is the “**minimal landscape**”. If daytime surface differs on some types corresponding to different regimes it may pick out for each of them the main distinguishing feature that exactly forms the base of pattern as some invariant. Just all individuals must percept this invariant. Each type corresponds the certain key process, for instance karst, erosion, deflation and others on the mineral level, meadow-organized, steppe-organized, forest-organized and other on the biotized level, agrarian, industrial, residential, urbanistical and many other variants on the anthropotized level. This concerns relief too that includes in landscape organic: **relief is the pared-down landscape**.

At last in Landscape Ecology was worked out the **zero landscape** that may be interpreted as the situation when the daytime surface structure isn't well-ordered and any regularities in the generative regime are absent. This signifies that we have to deal with situation when structure entropy arrives at maximum and we cannot uncover any drawing. In case of topographic note this will signify smooth (plain) surface or casual allocation of small deviation from level-headed plane and absence of the relief (**zero relief**).

I need to note that we can form some landscape only if the surface contains the harmonies. In such a case the comprehension of landscape is determined as the creating form based on the relation between this harmonies on all levels. It's well shown by T. H. Keitt (2000) on fig. 4. This moment is important: we ourselves form the pattern in our mind on the base of daytime surface structure.

The presence of scaling in daytime surface structure leads to situation when we can percept landscapes on different scale levels and at that don't percept it on adjacent scale levels. For instance we can percept the whole river valley drawing when its slopes and flood-lands drawings doesn't percept as something self-dependent. But

when we attract attention to flood-lands drawing we don't mark another parts. So the whole picture consists of many patterns including one in other and they often collide. But all these parts are relative and often ones and the same fragments are including in the different locations as the landscape-generative space of daytime surface: topology is complex. Every occasion is our own allotment inasmuch as in real daytime surface is the unity and not a simple mosaic. Such property opposes the attempts to proclaim that this or other schema of division as only one corrects variant as it often took place in soviet geography that was originated from L. Berg's works. It was the rough mistake: the unity may not be separated into single parts. As for notion of phase the classification unit that was brought in geography isn't connected with L. Berg. As I. Pusanov showed it was done in 1883 year by Marion (Pusanov, 1912).



**Fig 4.** Spectral representation of pattern and scale. Each diamond represents a spectral component of the landscape. In fractal landscapes, amplitude decreases as a power-law function of the frequency. The logtransformed slope of the relationship is related to the roughness or fractal dimension of the surface. The change in frequency between successive spectral additions is related to the lacunarity of the surface.  
*Source: Keitt, 2000.*

It's quite another matter that touches the daytime surface consisting in that we can analyze it by the way of division of the classified components of different levels. For instance it may be physiophases as homogeneous parts and urochisches as a combination of phases but not a location. Repeat once more: location is the landscape-generative (as well as relief-generative) part of the daytime surface and it may stand out for different scales and levels of complexity. We can pick out locations of phase complexity level or urochische complexity level. All will be determined by the aims of research. As a whole the dismemberment of some surface on phases is the way of putting in order the researcher's observations as it was showing by I. Pusanov (1912). All is relatively. All that we see consists of invisible parts the relation between which shows the visible structures. The structure on the elementary level is in the constant

move and may not be expressed neatly. And this co-ordinates with the U. Eco (1968) point of view about disappearing structure.

We can imagine the landscape-generative process as the landscape-generated current with different regimes that are cut by secant surface. In such type of current some parts are characterized as laminar move and others – vortical that reflects on the daytime surface structure and is dynamic in the form of different drawings. The vegetable cover is the best example. Such representation can consist of grate or little lots that form mosaic with different geometry including fractal design. We can use many analytic methods for such mosaic researches. On fig. 5 are shown two patterns: a) with the high symmetry sets from regular hexahedrons and b) with dislocated symmetry as the result of arbitrary displacement of the polygon's centers. For the building of patterns was used the Voronoj's method. Under each pattern are shown their two-dimensional Fourier-spectrums that reflect the degree of deviation from the regularity. In the nature we can find many examples of different origin and organization levels. They are always connected with motion of the water, air and ground plants growth, vital functions and human activity. But with the complication of dynamic the structure of corresponding patterns becomes more and more intricate inasmuch as emergent mosaics represent the motion with regimes of the strange attractor with zones of regular and chaotic regimes. It's interesting that the daytime surface structure includes the information about generative dynamic: **morphology is the system stark dynamic**. We begin our research from survey of daytime surface and try to separate marking of process acting. Then we constructed the model of acting that explains the descent of this making and returns to surface again with the aim of seeing the whole.

Another example of insular surface structure research is given on fig. 6. A. Zotov and A. Saranin (2006) proposed such space structures. Such variants may take place in regions of internal erosion, karst and temperature logging distribution. I add the Fourier-spectrums and correlogrames (in such a way we can also analyze any scenery using the color photo). All these cases are connected with processes of vertical motions of substrate. But such motions are typical in still more degree for biotized regimes. Here we have the plants that action against gravitation forces that exactly stimulate the vertical motion. Each plant is not other than a canal from which the matter is moving. The volume and temp of this moving is determined by physiologic peculiarities of species and concrete indited. The differences between them determine the degree of deviation from regular hexagonal lattices. However similar situation we disclose in allocation of settlements. On the anthropotized level settlements draw the energy, matters and human currents, that influence on its allocation and evolution of the whole settling net, though have the peculiarities of initial space.

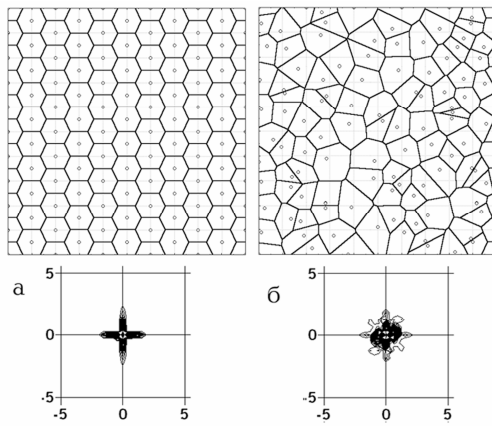


Fig. 5. Two variants of surface structure and their Fourier-spectrum: a – regular hexagonal lattice, b) result of the arbitrary displacement of the polygon's centers.

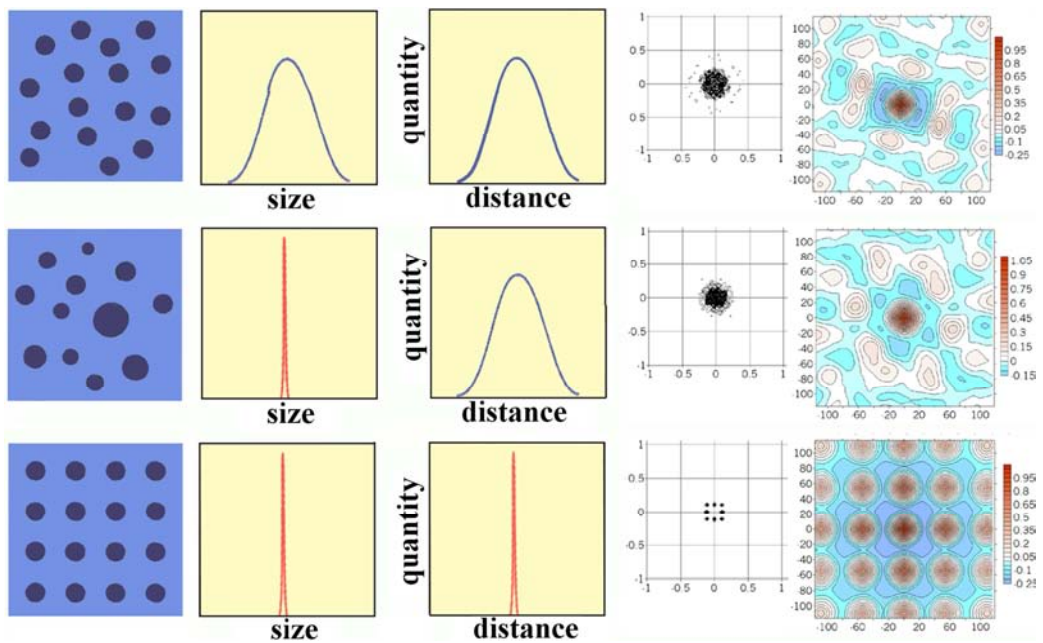


Fig. 6. Types of islets bodies (right column), their distribution at the sizes (second column) and at the distances between nearest islets (third column). Above – usual body of islets, middle row – undigested allocation islets of different in sizes, below – well-ordered allocation of identical size islets (Zotov, Saranine, 2006). At right is shown their Fourier-spectrum (fourth column) and correlogrames (fifth column) that are added by the author.

## LANDSCAPE AESTHETIC

Our understanding of landscape phenomena presupposes the research of its aesthetic properties. In fact different landscapes stimulate the aesthetic sense in different degree. But what's the nature of this sense or sense of taste and other similar sensations. It may be the projection of perceptible on the sentimental flatness of our consciousness. Therefore it in many respects depends on individual sensitivity such as aesthetic breeding, living aims and other similar circumstances. It means that in the decision of this question we must apply to research of man himself.

This aspect has the deep background inasmuch as the initial word "landshaft" was put into use just as aesthetic natural background on the pictures of painters. It happened in Renaissance time and must be considered as revolution in attitude to Nature from the outside. May be this moment is connected with aspiration to chaos withstood. But in China the painters of the unexplored wilderness appeared exaggerated: man always aspired to live in stable environment. During some milleniums man selected in the nature the examples of regular phenomenon such as volcanic cones or remains with high symmetry degree that moreover received sacral sense and became the prototypes of the religious construction. Man was the point that connects the well-ordered cosmic world and undigested terrestrial world in which the regularities that he may uncover, was very limited. Such forms were surprised and they may consider as representation of the cosmic on earth daytime surface. Just so garden becomes the prototype of order. It may be the East influence leading to changing in nature perception inasmuch as just here the earth world comprehension as the order and chaos combination. In some moments in perception of real nature some changes occurred and too much regular gardens and parks evolutions in more complex forms that demanded more complex gardening design (the China's and Japan's gardens). But such form of beauty is exaggerated and per se life-less. If this becomes noticeable, then man passes to other pole – to the unexplored wilderness – the world in which he can disappear, dissolve. Man is returning to the Nature that he considers not as resource for himself but the subject for intercourse, as the complementary side outside of which he may not exist.

Later on the landscape beauty was hymn of poets and writers. Just this was compelling geography to say about artistic and poetic geography. Inasmuch as by author was proposed such name as **Artgeography** with the next research object: that is the nature of attraction and how forms of spiritual connection between man and surrounding scenery appear. We have many examples of wonder bright landscape description in belles-lettres. For instance, the survey of nature writing in English tradition was done by R. Finch and J. Elder (*Nature Writing...*, 2002). Anthuan de Saint-Exupery gives much vivid descriptions of landscape especially deserts ones. But these ima-

gines are depicted from the present intelligence and the language here may be used similarly in poetic, where, as it's well known, the speech isn't about exact depict but about the cast determine pictures in the listener's consciousness the definite images and the inner associations to call.

I think this problem wounded the perception aspect known as phenomenology, within which the perception by body is considered. There are many fundamental works in this philosophy school including M. Merleau-Ponty. He shows that visual field we must understand isn't the mosaic but the system of configuration (Merleau-Ponty, 1948) that is important for landscape perception. Beside this each of us has own scheme of the body that implements the limits and a great extent determines the character of perception. But perception needs to listen to our own inner voice and to add senses to states of our own body. Nothing another is given to us. And our aesthetic estimation occurs on the contact of different feelings (synestezia) and artistic thoughts based on the perception notions as that R. Arnheim understood. But it may not be expressed numerically. It's important that configurations and their units that we pick out in the structure of the daytime surface we endow with some senses on the base of their topology.

#### REFERENCES

- Simonov Y.G., 1876: Analiz geomorphologicheskij sistem. Actualnie problemi teoreticheskoy i prikladnoy geomorphologii.–M.– p. 69 – 92.
- Schumm S.A., Mosley M.P., Weaver W.E., 1987: Experimental fluvial geomorphology. A Wiley-interscience Publication John & Sons – New York Chichester Brisbane Toronto Singapore. – p. 413
- Bak P., Chan K., 1991: Self-Organized Criticality. Scientific American, p. 26 – 33.
- Kovalyov O., 2005: Geographicheskii landshaft: nauchni, estheticheski i fenomenologicheskii aspekts. Kharkiv: Ecograph. – p. 388.
- Klironomos J.N., 2002: Feedback with soil biota contributes to plant rarity and invasiveness in communities. Nature. Vol. 417 .2 MAY.- p. 67 – 70.
- Fellmann J., Getis A., Getis J. Human Geography., 1997: Landscapes of Human Activities. USA: WCB/Me Graw-Hill (Nimes Mirror Higher Education Group, Inc.), 545 p.
- Keitt T.H., 2000: Spectral representation of neutral landscapes. Landscape Ecology 15: 479–493.
- Pusanov I., 1912: Ocherky Severo-Vostochnoho Sudana. Zametky i nabludenia naturalista. Glava III. Port Sudan. Zemlevedenie.–M.–Knizhka III – IV.– p. 150 – 171.
- Eco U., 1968: La structure assente. – Milano. – 369 p.
- Zotov A.V., Saranin A.A., 2006: Magicheskii klasteri i drugie atomnie konstruktii. Samoorganizatsia uporyadochennih nanostruktur na poverhnosti kremniya. Priroda – M.: akademizdatcentr "Nauka" RAN, N 4. – P. 11 – 18.



- Nature Writing 2002. The Tradition in English. By R. Finch and J. Elder. – New York, London, Norton, 1152 p.*
- Morlean-Ponty M., 1948: Le cinema et la Nouvelle Psychologie. – In: Sens et nonsens, Paris, Nagel. - pp. 97-122.
- Arnheim R., 1974: Art and visual perception. A psychology of the creative eye. Berkeley and Los Angeles: University of California Press.
- Keitt T.H., 2000: Spectral representation of neutral landscapes. *Landscape Ecology* 15: 479–493.
- Пузанов И., 1912: Очерки Северо-Восточного Судана. Заметки и наблюдения натуралиста. Глава III. Порт Судан. Землеведение – М. - Книжка III – IV. - С. 150 – 171.
- Симонов Ю.Г., 1976: Анализ геоморфологических систем. Актуальные проблемы теоретической и прикладной геоморфологии.–М. – С. 69 – 92.
- Зотов А.В., Саранин А.А., 2006: Магические кластеры и другие атомные конструкции. Самоорганизация упорядоченных наноструктур на поверхности кремния. *Природа*. – М.: Академиздатцентр «Наука» РАН, № 4. – С. 11 – 18.

## SUMMARY

The author proposes the new presentations about nature of information appearance and causes of development in a whole, the conception of the Geospace as the result of the Earth spherical symmetry breach and conception of a landscape as the communicative surface organization in the whole case. It shows that two-dimensional Fourier-spectrums is good method of analyze a daytime surface. For the geographical landscape it is the daytime surface organization. The presentation about Geoworld structure including mineral geosphere, biosphere, anthroposphere (agrosphere, technosphere, noosphere) and divosphere is given.