



# Journal of Geology, Geography and Geoecology

Journal home page: [geology-dnu.dp.ua](http://geology-dnu.dp.ua)

ISSN 2617-2909 (print)  
ISSN 2617-2119 (online)

Journ. Geol. Geograph.  
Geology,  
31(3), 547-553.

[doi:10.15421/112251](https://doi.org/10.15421/112251)

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Journ. Geol. Geograph. Geoecology, 31(3), 547-553

## On the question of the philosophical foundations of the geocotones theory: synergetics, anthropocentrism, geosystem paradigm

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Received 10.02.2022;

Received in revised form 22.02.2022;

Accepted 07.08.2022

**Abstract.** In this article, the problem of the philosophical foundations of the geographic theory of geocotone is considered. As such, the authors propose the traditions of neoplatonic philosophy, based on the ontological teaching of Empedocles, the modern philosophical teachings of the actor-network theory of B. Latour and object-oriented ontology. The

noospheric power of a person is realized in globalization processes through the expansion of various social and economic institutions, primarily the global ones, which cause corresponding changes in the activities of institutions at lower system levels, and those, accordingly, already have a direct impact on their environment. The borderline character of the geocotone is historically enhanced as the anthropogenic impact on the geographic shell as a whole and its individual elements intensifies. Geocotones are formed as a special type of geosystems, which are complex systems characterized by a contradictory unity of internal heterogeneity and functional connectivity. The action of the anthropogenic factor is so broad that almost any fragment of modern geospace can be classified to geocotones in the state of bifurcation and uncertainty. The direct result of the development of mankind was the formation of multilevel ecological and economic systems. It has been determined that the spatial formation of such systems is directly related to the geocotonization of the geographic shell. The authors analyze the approaches to the philosophical substantiation of the study of the culture and sociogenetic functions of the geocotone. The formation of geocotones is an objective process leading to the transformation of geographical knowledge itself. The logical-dialectical comparison of the processes of geocotonization leads to the idea of their isomorphism with the processes of the development of geographical science, characterized by the universalization and complication of the category-conceptual apparatus.

*Key words:* geocotone, theory of hierarchical systems, actor-network theory, technoanthropology

## До питання філософських підстав теорії геоекотону: синергетика, антропоцентризм, геосистемна парадигма

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**Анотація.** У статті обґрунтовується проблема філософських основ географічної теорії геоекотону. У якості таких пропонуються традиції неоплатонічного філософствування, що ґрунтується на онтологічному вченні Емпедокла, до сучасних філософських учень акторно-мережевої теорії Б. Латура та об'єктно-орієнтованої онтології. Ноосферна сила людини реалізується в глобалізаційних процесах через експансію різних соціальних та економічних інститутів, у першу чергу, загальносвітових, які викликають відповідні зміни діяльності інститутів на більш низьких системних рівнях, а ті, відповідно, вже безпосередньо впливають на навколишнє середовище. Пограничний характер геоекотону історично посилюється із посиленням антропогенного впливу на географічну оболонку в цілому та окремі її елементи зокрема. Геоекотони формуються як особливий вид геосистем, що є складними системами, характеризуються суперечною єдністю внутрішньої неоднорідності та функціональної зв'язаності. Дія антропогенного фактору настільки широка, що практично будь-який фрагмент сучасного геопростору можна віднести до геоекотонів, що перебувають у стані біфуркації, невизначеності. Безпосереднім результатом розвитку людства стало формування багаторівневих еколого-економічних систем. Встановлено, що просторове формування таких систем без-

посередньо пов'язано з геоекотонізацією географічної оболонки. Автори аналізують підходи до філософського обґрунтування вивчення культуро- та соціогенетичної функції геоекотону. Формування геоекотонів є об'єктивним процесом, що призводить до трансформації власне географічного знання. Логіко-діалектичне порівняння процесів геоекотонізації дозволяє сформулювати ідею щодо їхнього ізоморфізму з процесами розвитку географічної науки, яка характеризується універсалізацією та ускладненням категорійно-понятійного апарату.

*Ключові слова: геоекотон, теорія ієрархічних систем, акторно-мережева теорія, техноантропологія*

## **Introduction.**

The science of geography as one of the fundamental sciences, somewhat lacks philosophical application, unlike other natural sciences, like for example physics and biology. The low number of studies focusing on formulation and research of its philosophical problems entails negative consequences for the dynamics of scientific search within this science. Even less attention is paid to questions, by solving which geography could offer interesting material to philosophy. This statement is relevant for all the main directions of the philosophical knowledge – ontology, gnoseology and ethics.

The significance of the philosophical conception of geography increases due to the ongoing differentiation of geography, emergence of new disciplines, scientific schools and directions. The main source of updating geographical knowledge is activation of objective globalization processes all around the world, which influence the entire geographical shell. Uncovering them leads to such a level of concrete-scientific knowledge, when it is impossible to formulate answers to relevant issues without employing philosophical concepts and theoretical constructs expressing them.

Study of globalization processes has led to the necessity of formulating the main methodological principles, transcription of novel gnoseological positions of various philosophical theories about concrete geographic structures. They include many unique geographic formations – geocotones, specific forms of organization of and interaction between all types of motion of matter, manifesting through mutual influences of geographic, biological and social objects of various levels of systemic organization of the universe.

Employment of systemic organization of the geographic shell and recognition of the principle of systemicity itself as one of the leading ones in cognition of geographic objects inevitably lead to recognition of anthropocentrism as an equal methodological principle. Comprehension of the geographic space of the Earth in its relevant conditions is impossible without mankind, outside society, since it is man who – as the main subject of cognition – unpacks new qualities of research objects, based on the overall amount of earlier conceived objects and the entire structure of the culture in which it is directly included.

## **Materials and methods.**

When preparing the article, we used the materials of our own landscape researches of the interzonal forest steppe-steppe geocotone of the Right Bank Ukraine. The research is based on modern theoretical-methodological basics of the anthropogenic landscape science, constructive geography and sustainable nature management.

## **Results of the research.**

In philosophical discussion it is accepted that methodological reflexion cannot be limited by subject field of discipline, without going outside the borders of its subject. Because of the integrity of the environment, its systemic nature, it is inevitable that the ideas of the prominent Ukrainian scientist V. I. Vernadsky be employed, on the one hand, and the ideas of the theory of hierarchal systems, on the other hand, since the organization of space creates hierarchy and inequality, according to the authoritative French historian and geographer F. Braudel (Tyutyunnik, 2011).

Analysis of philosophical fundamentals of the science of geography was the object of the monograph of Y. H. Tyutyunnik. In that monograph, the author traces the philosophical substantiations of geography from the initial ontological intuitions of European philosophy, – direction of vision, features, and events. This was achieved by directly using not only poorly researched fragments of texts of classic Ancient Greek philosophy, but also the heritage of leading philosophers of the XX century, – A. F. Losev, ideas of German geographer A. Hettner. The author emphasizes the fundamental position of the latter: «It may be considered quite appropriate to define geography as a science about spaces of the Earth's surface according to their substance content... Composition and interaction of various phenomena in space is the soul of geography» (Tyutyunnik, 2011).

Talking about methodological function of geography is also possible in the context of the ideas of V. S. Preobrazhensky, who noted that geography – by its spatial approach – provides material to all other sciences and even natural science in general. At the same time, he notes «the existential plan» of geography.

The important historical-philosophical conclusion of Y. H. Tyutiunnik is that no other person could be recognized as the founder of the landscape-science view of the world than the Ancient Greek thinker Empedocles, distinguishing particular evidences of such a position. Nonetheless, this conclusion requires additional historical-philosophical elaboration.

The main motive force of globalization's is humankind. Specifically, those humans striving for enlargement of their spatial presence and realization of their will toward everything existing are the «engine» of globalization. The noosphere force of humans is realized in globalization processes through expansion of various social and economic institutions, first of all, global, which cause respective changes in the work of institutions at lower systemic levels, which – in turn – have indirect effects on their environment.

In the Ukrainian community, introduction of the concept «geography of global processes» and formation of the discipline itself is directly associated with the researches of landscape science geographers of the Pavlo Tychyna Uman State Pedagogic University. In the monograph «Climatic conditions and agroclimatic resources of Cherkasy Oblast», the authors used the technique of evaluation of globalization geoclimatic processes on separate elements of geographic environment and also living conditions of the population and agricultural and economic activity of humans in a particular region.

On particular empirical material, it was revealed that the processes that have been initiated by a significantly spatially remote source have direct effects on geocotones of Ukraine (similarly to any other area). At the same time, there is emphasis on the opinion that even at the concept level, the geocotone expresses the noosphere unity of environment and man, stilled materiality and volitional activity. The concept of ecotone – which was initially introduced to characterize processes in bordering, transitional spaces between various natural systems – was expanded by the inclusion of processes occurring at the border of not only natural systems, but between natural and anthropo-systems. Therefore, it obtained a more systemic, synergic pattern, emphasizing the importance of human activity, anthropologization of the environment.

It should be noted that ecotone, by its content, is a complex existential object. It is a mix of heterogeneous and absolutely different components of various natures. Such components of ecotone are so closely associated with each other that they form a new object – geocotone. Classic gnoseology has not provided approaches to studying such objects. This became possible only after formation of a new sphere of in-

ter-disciplinary knowledge – theory of synergetics, and also introduction of the ideas of French scientists G. Deleuze, J.-L. Nancy and B. Latour. In our opinion, the central category of the theory of B. Latour – heterogeneity – has great potential to characterize the specifics of geocotone. It is understood as a heterogeneous association that avoids any earlier ascribed transcendental processing and cannot be interpreted from any normative-established naturalistic positions. No matter how we try to cognize the geocotone as a natural integrity, we are unable to do so without appealing to such phenomena where man is an independent agent, on one hand, and without holding that man is interacting with it, on the other hand. Therefore, we see that employing the principles of systemic organization of geocotone and its synergic nature inevitably leads to the principle of anthropocentrism.

It should be emphasized that the bordering character of geocotone historically increases, with increase in anthropogenic effects on the geographic shell in general and its separate elements. This hypothesis is unpacked and substantiated in the article «Anthropogenization of interzonal geocotone «Forest steppe-steppe» of the Right Bank of Ukraine in 19th-21st centuries». The main conclusion of the article is that those «natural borders of the interzonal geocotone of the Right Bank Forest Steppe and the Steppe of Ukraine are almost impossible to distinguish due to their complete anthropogenization» (Sytnyk, Bezlatnia, 2018).

Philosophical substantiation of the geocotone theory will inevitably touch on the question of borders of objects occupying various levels in hierarchal systems. In fact, geocotone is an individual super organism. Through the idea of geocotone, we see the relativity of borders between organism and environment, society and surrounding nature. We may also note that with development of technical abilities of humans, those borders not only become thinner and more conditional, but also often transform into results of exploration by humans. According to the ideas of J. Scott Turner, we may state that geocotone is like a living organism, various inclusions to the structure of which inevitably alter the morphology, as well as physiology of humans and other living creatures. The goal of complex geobiological studies lies particularly in defining those «inclusions», their correlations with certain types of geocotone.

In the landscape structure of Europe, we should consider the following interzonal geocotones: «Mediterranean maquis – broad-leaved forests»; «broad-leaved forests – forest steppe»; «forest steppe – steppe»; «broad-leaved forests – mixed for-

ests»; «mixed forests – taiga». Also, special attention should be paid to geocotones in European regions of high zonality.

Geocotones develop as a special kind of geocosystem, and are complex systems, characterized by contradictory unity of the internal non-homogeneity and functional connections. Action of the anthropogenic factor is so broad that almost any fragment of contemporary geospace may be identified to geocotone in the state of bifurcation, uncertainty. By further developing the idea of T.V. Bobra that «impairment of natural (normal) spatio-temporal structure of the landscape sphere mainly by the anthropogenic factor and extension of areas of various types of geocotones determine the external essence of the process of ecotonization of landscape space» (Bobra, 2009), one may hypothesize that geocotonization is an empirically observed expression of action of globalization processes toward the geographic environment, its current, relevant form. Therefore, we see that the study of geocotones is impossible without utilizing the conclusions of such an interdisciplinary direction as theory of hierarchical structures.

This direction was formulated by Y. M. Hakimov at the border of systemic analysis, philosophy of cognition and synergetics. It is noteworthy that the primary empirical basis of the theory comprised specifically geographic and geological materials. The determined patterns were then analyzed and confirmed on broader material, including patterns of human activity. The theoretical sources of Y. M. Hakimov's concept were the early ideas of M. Mesarovich and D. Mako. The indicated authors analyzed their concept as one of possible approaches to solving tasks of managing complex multi-level systems and directed their interest toward possible mathematical formalization of the theory of management of large systems rather than meaningful generalizations of higher level.

Y. M. Hakimov's theory derives from the dialectic nature of interactions between hierarchy and non-hierarchy. Increase in the number of levels of organization is a direct factor of increase in instability of complex multi-level systems. In turn, increase in the system's instability causes transition to a qualitatively new level of organization, which requires transformation of the system structure itself, as well as relations within it (Hakimov, 2013). Increase in the system's instability and unpredictability of the direction of its further development and functioning «starts up» the compensatory mechanisms of acceleration of its functioning, and also leads to spatial expansion by more complete expenditure of the resources it has (Hakimov, Karogodin, 2013). A good illustration of

the indicated pattern is the processes in the interzonal geocoone «Forest steppe-Steppe» of the Right Bank of Ukraine, which we determined.

The special place of geocotone in the hierarchical system of geographic objects is intuitively indicated by the general positions of landscape geography that analyzes the geographic landscape shell as a place of intersection and interaction of heterogeneous and diversely-orientated flows of mass, energy and data, part of which is directed from the Cosmos to mankind, and the other part – from mankind to the Cosmos. The «machine» that is adjusting those flows and providing their communication within the integral mechanism mass-energy-data exchange is the geocotone. In this sense, geocotone may be equated with the object proposed by V. M. Pashchenko – georange (Pashchenko, 1993).

A direct result of the development of the mankind is the formation of multi-level ecological-economic systems. The formation of such systems was found to be spatially directly associated with geocotonization of the geographic shell. The global processes have a dual influence on this pattern: they simultaneously strengthen it by the global changes in the geographic environment itself (for example, the global climate changes), but they are also a cause of formation of new ecological-economic systems. Formation of the latter leads to the substitution of the direct naturally-developed and reverse relationships in the local ecological system by new artificially created anthropogenic relations. In other words, the system – most likely by enlargement of amplitude and frequency of bifurcations – approaches and reaches the «self-destruction point». Such an interpretation is quite possible for the phenomenon of increasing amount of lands withdrawn from agricultural use without performing special programs of their recultivation.

The synergic character of ecological-economic systems and geocotonization that is associated with its functioning is manifest in disruption of data flows between the elements of the system. In its nature, the indicated relations may be social-ecological, ecological-economical and social-economical. Realization of each of the types of the indicated relations leads to the corresponding transformation of other types, i.e. we have the informational nature of their interactions. This nature creates the importance of the subject of corresponding activity, its ability to «read» this data and – under its influence – to transform its activity by increasing or decreasing the respective processes of geocotonization. The actor-network theory of B. Latour allows one to approach the geocotone as an individual existential entity. This theory is based on the



perception that other than humans, other formations on higher or lower levels of systemic organization of the world are able to act. All such formations are called «actors». Indeed, B. Latour proposed «an epistemological paradigm that leads to reimagining of the transcendental definition of experience and creation of empiric ontology of a novel type» (Kononova, 2015).

Processes of geocotonization give birth to the substitution of the determined relations between the elements of the geographic environment by probabilistic and probabilistic-determining. In order to support «pseudo-equilibrium» of the system, such a change requires more and more energy resources, use of which, in turn, is becoming more and more limited by spatial expansion of the system as a way of compensation of its instability. The latter is associated with increasing rates of centers of heterogeneity which lead to emergence of new geocotones. Overcoming the destructivity of this process is only possible if the indicated heterogeneity centers cause formation of systems of higher hierarchic order, which is directly associated with their even greater anthropologization.

During the analysis of the problem of causality in the study of geocotones, we think it is necessary to clearly distinguish the real and sense-perceived interactions between geocotone and other objects of the same hierarchal level of systemic organization of matter. Such an interaction, for example, with geological platforms, remains almost unresearched. Instead, there is modeling of the indicated interactions, in which the place of actually interacting object is given to the consciousness of the researcher, including perceptions about the nature, structure and behaviour of both actual objects. Integration of this perception is possible in the framework of object-oriented ontology as a novel philosophical theory. Based on those views, one may come to inclusion of a number of philosophical positions of M. Heidegger, particularly those about distinguishing between objects and their qualities, into the circle of methodological circle of theories of geocotone (Heidegger, 2007). Expansion of the geocotone theory through «optics» of object-oriented ontology allows the consideration of issues of aesthetics of geographic space, which is a place of formation and unfolding of aesthetic qualities of objects and formation of an aesthetic sense of their perception.

We should also note that a research approach to geocotone as a subject run into the general methodological limitation holding that «objects are available to us only to a degree in which they are given in the perceptions of experience that is synthesized by learning structures. Therefore, any judgment about reality reports something

about the institution in which it is given – experience, and later – about language, signs, culture, social structures, discussion, etc» (Kharman, 2020). Realization of the views of followers of speculative realism is a methodological base for consideration of the culture-genetic role of the geocotone, its social-forming function. At the same time, it is obvious that research experience of operating with geocotone is still insufficient and does not allow one to determine all its possible interrelations with the processes of formation of society and culture in a certain geographic space.

Development of such a theory of geocotone based on the principle of anthropocentrism allows one to identify the ways of interaction of the theory with geopolitical teachings. In geopolitics, starting from Paul Vidal de La Blache, there is a certain paradigm of research that considers man to be an active geographic factor, unlike territory, which it considers a passive geographic factor. Will a particular geocotone transform into an actually active political component, which qualities and characteristics should it have to do so, – it depends only on activity of the society that interacts with the specific geocotone, on people living in it. Each geocotone, as a unique spatial and ecological cell of human adaptation to the environment, corresponds to a particular historically formed «way of life» of representatives of a given society. Abilities of European geocotones to expand, to be subject to external influences, to interact with neighboring ranges, became a geographic precondition for the formation of unique subcivilizations in Europe, one of which being the Ukrainian. Specifics of the structure and functioning of geocotones put certain frames on agricultural-political activity of society. Unfortunately, the indicated mutual dependencies still remain poorly researched and are almost unused in practice by bodies of state governance.

We believe that to understand the culture-genetic function of a geocotone it is important to understand that formation and functioning of the culture, its connection with a certain geographic space goes beyond the borders of the traditional realism and methodology of natural sciences. It implies recognition of the metalogical beginning of the universe, inaccessible to the common formal logic. Entering it is only possible through involvement of out-of-science forms of perception – religion and art, for they are «above-systemic beginning...the metalogical beginning, incommensurable with the world, for nothing existing in the world can be brought under a general common term with it...Above-systemic. Nothing is an above-relative beginning...The global system is impossible without a beginning that is higher than the world»

(Mozhaiskova, 2001). Discovering such a metalogical base of the culture-genetic and socio-genetic functions of Ukrainian geocotones plays important ideological role in constructing the political doctrine of the civilizational role in the identity of Ukraine as an individual nation.

To study the cultural- and sociogenetic function of the geocotone, we think it would be promising to integrate the conclusions of the geocotone theory and the data of paleogeology, which is being actively developed by K.Y. Aksenov and M.V. Mikhnovets (Aksenov, Mikhnovets, 2021). Their attention is focused on the patterns of refraction in a social actor's perception of his or her current geopolitical landscape. As an object of research, the authors chose works by F.M. Dostoevsky. We think it would be interesting and relevant to describe Ukrainian geocotones in the artistry by notable figures of the Ukrainian culture, peculiarities of the abovementioned refraction in the works by Ukrainian-language, Russian-language, Polish-language and Jewish authors.

Increase in the anthropologic influence on the geocotone leads to weakening of hierarchal order of the system, replacement of part of its lower levels by the integrities of higher hierarchal levels. Weakening of the hierarchy leads to increase in the system's order, thereby decreasing its productive capacities.

Formation of geocotones is an objective process that leads to transformation of the geographic knowledge. Logical-dialectical comparison of the processes of geocotonization leads to the idea of isomorphism with the processes of the development of geographical science, characterized by processes of universalization and complexification of the category-concept apparatus. Consideration of geography as a special system allows one to distinguish concept complexes in it, as well as relations in it, which lead to the formation of theoretical formations of higher level of commonality. Such a formation is the concept of geography of globalization processes.

Development of geography of globalization processes at this stage of development makes relevant and inevitable the philosophical reflexes of obtained results and directions of the further scientific search, identification of such «centers of instability», within which new knowledge would generate. Obviously, due to the hierarchal nature of the structures of the sciences, such «centers» are associated with interdisciplinary researches, stepping outside of strictly geographic cognition not only to bordering spheres of ecology, biology, but to the sphere of economics, and more broadly – sociology, political science, theory of interdisciplinary relations.

As a methodological approach to the geocotone theory, the theory of techno-anthropology, proposed by S.V. Sokolovsky, may be of interest. In particular, it may be the analysis of interrelations of «society-geocotone» within the categories «extensions», when geocotone is considered a certain technical artifact which is given the abilities to perform certain functions of the human organism, whereas, on the other hand, man is considered as a specific tool, using which the geocotone performs some of its functions as an actor (in sense of B. Latour's theory).

A separate notice should be made that interaction between the cognitive process in the theory of geocotone and geography of globalization processes leads to changes in the methodological base of the researches. An example may be the replacement of the traditional cartographic method by its isolinear-field type, and also active use of the method of informational gradients in the cartography, the only one allowing adequately depiction of the formation of geocotone «on a map», as well as influence of certain global process (for example, warming) on a number of geographic systems. Increasingly relevant is the development of a methodological base of the research on anthropogenic transformation of geographic space over the course of the globalization processes of various geneses.

### Conclusions.

The attempt we made to understand the philosophical fundamentals of the geocotone theory in the aspect of the globalization processes in the geographic shell of the Earth allowed us to come to the following conclusions. The geocotone theory – as a scientific theory of middle level of commonality – is a base for empirical verification of the positions of novel philosophical theories that belong to methodology and philosophy of science, as well as social philosophy, philosophy of history and philosophy of culture. The philosophical fundamentals of the geocotone theory are impossible to consider within the framework of a single philosophical paradigm. They belong to anthropological teaching, and to theory of hierarchal systems, and also to actor-network theory, to object-oriented ontology. New interpretation and understanding of the philosophical fundamentals of geography in general and its certain directions are relevant fields of putting efforts of collaborative projects of both philosophers and geographers. Using the analysis of the philosophical fundamentals and methodological questions of the geocotone theory allows target-oriented scientific search to be conducted within the framework of this theory and creates preconditions for solving a number of scientific problems in it.

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