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## THE GEOLOGICAL AND GEOMORPHOLOGICAL MONUMENTS OF UKRAINE AND THEIR SIGNIFICANCE FOR THE DEVELOPMENT OF NATURAL-COGNITIVE TOURISM

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**Abstract.** The article reviews publications devoted to geological and geomorphological monuments of Ukraine highlights specific features of their formation in different regions and reveals their importance for the development of nature-cognitive tourism as a basis for the formation of the tourism industry. The methodological unity of the concepts "geological monuments" and "geomorphological monuments", which characterize the original course of natural processes and their results and therefore have great scientific and cognitive value are considered. Emphasis is placed on the important participation of geomorphological processes in the formation of natural monuments, which show different geological monuments on the earth's surface and reflect not only the features of geological factors but also the diversity of relief processes, their dynamics, which determines the status of most monuments as "geological and geomorphological".

Important for establishing the protection status of geological and geomorphological monuments are the developed criteria for assessing the aesthetics of the relief of Ukraine, its uniqueness, the presence of features "architecture-composition", combination with other elements of the landscape, stability or mobility, imagery – photogenicity, visual effect, emotional perception, attractiveness, etc. It is noted that the category of natural phenomena "geological and geomorphological monuments" is characterized by significant conservatism compared to other components of the natural environment. Such monuments are carriers of paleogeographic and ethnocultural content, which, in addition to scientific significance, gives them the status of interesting tourist attractions. This creates an opportunity for the development of nature-cognitive tourism, which can be both independent and successfully complements all other known types of tourism.

Geological and geomorphological monuments influence the nature of recreational activities. The specificity and sequence of recreational functions of the relief of Ukraine according to the special properties of endogenous, exogenous, and anthropogenic genetic varieties of recreational geological and geomorphological monuments have been established.

**Key words:** geotourism; nature-cognitive tourism; geological-geomorphological monuments; geoheritage of Ukraine.

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## ГЕОЛОГІЧНІ ТА ГЕОМОРФОЛОГІЧНІ ПАМ'ЯТКИ УКРАЇНИ ТА ЇХНЕ ЗНАЧЕННЯ ДЛЯ РОЗВИТКУ ПРИРОДОПІЗНАВАЛЬНОГО ТУРИЗМУ

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**Анотація.** Проаналізовано публікації, присвячені геолого-геоморфологічним пам'яткам України. На конкретних прикладах висвітлено особливості їхнього формування в різних регіонах та розкрито їхнє значення для розвитку природопізнавального туризму як основи для формування туристичної галузі загалом. Розглянуто методологічну єдність понять “геологічні пам'ятки” та “геоморфологічні пам'ятки”, які характеризують споконвічний хід природних процесів та їхні результати і тому мають велике науково-пізнавальне значення. Наголошено на важливій участі геоморфологічних процесів у формуванні пам'яток природи, які експонують різні геологічні пам'ятки на земній поверхні та відображають не тільки особливості геологічних чинників, але й різноманіття рельєфоутворюючих процесів, їхню динаміку, що визначає статус переважної більшості пам'яток як геолого-геоморфологічні. Важливим для встановлення природоохоронного статусу геолого-геоморфологічних пам'яток є розроблені критерії оцінки естетики рельєфу України, його унікальності, наявності особливостей “архітектоніка–композиція”, поєднання з іншими елементами ландшафту, стійкість чи мобільність, образність, фотогенічність, візуальний ефект, емоційне сприйняття, привабливість тощо. Зазначено, що категорія природних явищ “геологічні та геоморфологічні пам'ятки” характеризується значним консерватизмом, порівняно з іншими компонентами природного середовища. Такі пам'ятки є носіями палеогеографічного та етнокультурного змісту, що, крім наукового значення, наділяє їх статусом цікавих туристичних об'єктів. Це уможливує розвиток природопізнавального туризму, який може бути як самостійним, так і вдало доповнювати інші відомі види туризму. Геологічні та геоморфологічні пам'ятки впливають на характер рекреаційної діяльності. Встановлено специфіку та послідовність рекреаційних функцій рельєфу України за особливими властивостями ендегенних, екзогенних та антропогенних генетичних різновидів рекреаційних геологічних та геоморфологічних пам'яток.

**Ключові слова:** геотуризм; природопізнавальний туризм; геолого-геоморфологічні пам'ятки; геоспадщина України.

### Introduction

All over the world, nature tourism is realized in various forms and primarily through the development of geotourism, which is gaining popularity.

Geological and geomorphological monuments are characterized among other natural sites by much conservatism, which is always of great interest to science, not only because of the phenomenal form and content but also due to human interest in the development of Earth's nature in the past. Therefore, the tourist attractiveness of such

objects is valued by those who want to look "deep into the ages" while being on vacation, as almost all these monuments have distinct paleogeographical features.

The role of geological and geomorphological monuments in the formation of the ethnocultural environment of certain areas is also significant, as the development of civilization, as proved by numerous examples, is closely related to such important components of the natural environment as the earth's surface and geological structure of the upper crust. Comfortable places of the earth's surface, stable dynamic geomorphological processes, availability the sufficient surface water together with soil, mineral, and biological resources determined at all stages of human evolution the location of the main centers of civilization, giving localities their unique ethnic and cultural characteristics.

Current tourism trends in developed countries are increasingly leaning towards environmental knowledge, along with historical aspects, as well as the knowledge of the natural processes which shaped the relief of the territory, where the educational role of geomorphology becomes visible. Thus, along with traditional types of tourism, today there is a tendency to the formation of natural-science tourism, among the objects of which a prominent place belongs to the knowledge of geological and geomorphological monuments.

The composition of "geological-geomorphological" does not indicate the leading or secondary role of any of these monuments' features. It is rather a tribute to the previous traditions of the development of geological knowledge, which in the early stages of civilization provided the human community with important mineral resources. In fact, in the context of interest in geological and geomorphological monuments, a vacationer needs to create an aura of fascination with the external landscape features of monuments, and then immerse himself in explaining their formation, both geomorphological and geological content.

Attractive geological and geomorphological monuments can serve not only for scientific purposes, but also to contribute to the sustainable development of the regions and local communities, acting as a quality tourist product.

The purpose of the article is to highlight the peculiarities of the formation of geological and geomorphological monuments in different regions of Ukraine and to reveal their significance for the development of nature-cognitive tourism as a basis for the formation of the tourism industry.

#### **The materials and methods**

Materials for the article were previous Ukrainian publications as a basis for the formation of natural knowledge about geological and geomorphological monuments (Fig. 1): Geological monuments of Ukraine, edited by Kalinin V. I. and Gursky D. S., in four volumes (2006–2011); Natural and ethnocultural phenomena of Ukraine (2004), Quaternary geology (2019), Natural and ethnocultural heritage of Ukraine, Relief of Ukraine (2012), Geological and geomorphological monuments of Ukraine (2020), as well as research by the authors of these objects: Stetsiuk, V. (2012), Stetsiuk, V., Rudko, G., Tkachenko, T. (2012), Grytsenko, V., Rudenko, K., Stetsyuk, V. (2012), Bortnyk, S. et al. (2019), Lavruk, T., Makarenko, V., Stetsiuk, V. (2019), Bortnyk, S. et al. (2020),.

Data on geological and geomorphological attractions of the Ukrainian Carpathians region and their tourist attractiveness have been collected by many well-known

Ukrainian researchers: Zinko, Yu., (2004); Kravchuk, Ya, (2006); Monchak, L., Stelmakh, O., Khomyn V., (2010); Bayrak, G., Teodorovych, L., (2020) and others.

Important for the development of nature cognitive tourism in some regions of Ukraine are publications: Denysyk, G., Strashevs'ka, L., Korinnyj, V. (2014); Brusak, V., Moskaliuk, K. (2015); Manyuk, V. (2016), Bortnyk, S. et al. (2021).



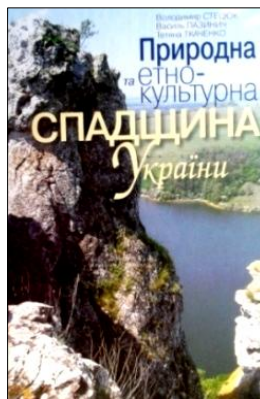
Geological landmarks  
of Ukraine



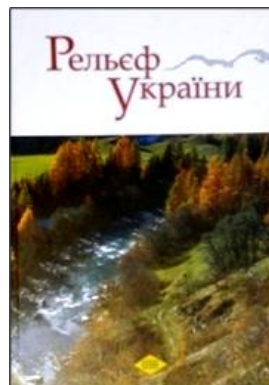
Natural and Ethnocultural  
Phenomena of Ukraine



Quaternary geology



Natural and ethno-  
cultural heritage of  
Ukraine



Relief of Ukraine



Geological and geomorpho-  
logical monuments of Ukraine

Fig. 1. Ukrainian publications as a base for the formation of natural knowledge of geological and geomorphological monuments

Methodological bases of scientific substantiation of selection of monuments and their interpretation are stated in articles: Bortnyk, S., Stetsyuk, V., (2019), Bortnyk et al., (2019). Science approaches and methods of research geological and geomorphological monuments were covered in detail by scientists of the Department of Earth Sciences and Geomorphology of the Taras Shevchenko National University of Kyiv at the conference Geoinformatics 2020. The organization of the database of geological heritage objects is considered in the work: Samoilenko, L.V. (2019).

European experience in the protection, preservation and use of geosites is valuable for study. These are publications: Reimold, W. (2001); Page, K. (2004), Coratza P.,

Giusti, C. (2005); Pereira, P., Pereira, D. (2010); Dowling, R. (2011); Wimbledon, W.A.P., & Smith-Meyer, S. (2013); Migoń, P., 2017); Gordon, J.E. (2018), Pál, M., Albert, G. (2021) and many others.

### **Results and discussion**

#### **Features of location and properties of geological-geomorphological monuments of Ukraine**

The territory of Ukraine is located within the tectonic structures of the earth's crust, which are characterized by different ages and rates of its dynamics reflected in the relief of the earth's surface in the form of general (denudation and accumulative plains, mountain structures), and partial features of the relief, and exposed to long-term denudation activity of a wide age range. The geological structure here is also characterized by considerable complexity, and there are many problematic phenomena, which makes further scientific and applied research relevant. Among the numerous methods, an important role has the exploration of geological and geomorphological monuments, which allows revealing the important stages of development of the natural environment of Ukraine, and on the other hand, has a high touristic and educational potential as well.

The complexity of the crust structure *in the plain regions of Ukraine*, the presence of numerous and varied tectonic structures, the complex structure of the crystalline foundation, which is often exposed on the surface and the diversity of the sedimentary cover, as well as the long and complex character of the crust's development, relief and the landscapes (that is, the complex and still unexplored paleogeographic situation), caused the existence of numerous geological and geomorphological sites.

An important approach to establishing the methodological basis for the legitimacy of the concept of "geological and geomorphological monuments" is to focus on the main properties of the factors of the formation of such objects. Among these, there are tectonic movements, magmatism, geological structure, composition and properties of rocks and their age, which altogether manifest themselves on the one hand in various landforms, and the morphology of the topographic features, their genesis, age, and ancient and modern dynamics on the other.

The morphological, genetic, age, and dynamic spectrum of geological and geomorphological monuments of the plain part of Ukraine, despite the apparent uniformity of the plain-like terrain, is very diverse. However, in such a variety, not to say variegation, it is possible to trace certain if not regularities, then a clear correlation between the nature of monuments and features of orohydrography, tectonics, geological structure, features of relief, and other components of the environment. Certainly, such a significant number of factors involved in the formation of geological and geomorphological monuments, each of which represents a subject of different approaches with own interpretation, classification, and systematization, does not allow to solve such issues today.

It is also worthwhile to begin the search for such dependencies from the most general ideas about the conformity of large landforms to certain tectonic structures that, however, in the process of their development, could change the direction of vertical movements. Thus, the starting point on the search of influence of tectonic movements on the formation of orographic features is the morphological analysis of landforms such as first, upland, plateaus, ridges, as the consequences of constant tectonic uplift, and secondly, lowlands, as the consequences of tendencies to lower the

Earth's surface. Usually, such dependencies are inherent in direct morphostructures. The change in the sign of vertical tectonic movements over time causes the formation of inversional morphostructures.

The establishment of the methodological basis of the concept of "geological and geomorphological monuments" in the mountainous regions of Ukraine is also based on the reflection in the landforms of the earth's surface of the main properties of these objects.

These natural monuments are a reflection in the forms of the earth's surface of impressive exotic tectonic movements, in particular – paleoseismic dislocations, expressive and representative forms of magmatism. Mountain areas are characterized by much greater (than on the plains) openness of geological structure, diversity of composition and properties of rocks and the relative unambiguity of their age – on the one hand, and a wide range of quantitative and qualitative indicators of morphological and morphometric features of the earth's surface, by its sharply different genesis at close distances, which reliable indications of ancient and modern dynamics on the other hand.

Geological and geomorphological monuments occupy a special place in this list as the geological structure visible on the surface is more complex, and tectonic is sharply different from the platform areas. There is much less power of the weathering rind and discrete distribution of sedimentary rocks (usually, the latter are significantly transformed by lithogenesis and catagenesis), and nearly the entire known spectrum of exogenous and endogenous geomorphological processes cause incomparably more monuments compared to plains. There are also the peculiarities of development of other natural phenomena controlled or determined by the peculiarities of the relief of the earth's surface (waterfalls, mudflows, avalanches, a complex of gravitational, slope, and in the Crimea – coastal processes, etc.).

The diversity of geological and geomorphological monuments in the mountainous regions of Ukraine has its own features to developing nature-cognitive geotourism, connected with the knowledge of the geological structure and landforms of the earth's surface.

First, the striking contrasts of the earth's surface heights, mostly unfamiliar to the population of the plains region; secondly – the greater exposure of rocks compared to the plains makes an impression and serves as an excellent testing ground for the development and geological-geomorphological monuments classification; thirdly, concerning the Carpathians – the neighborhood with the mountain structures of Europe is a reliable basis for developing methodological approaches to systematization and unification of knowledge about geological and geomorphological monuments; fourthly, the similarity of opportunities for the mountain of skiing is also dictated by the peculiarities of geological and geomorphological nature, and the infrastructure of ski resorts is suitable for the interest of recreants in the summer also.

Numerous unique geological and geomorphological monuments have been formed in the Crimean region due to the unique combination of sea and mountains, mild climate, as well as well-known speleological phenomena, mud volcanism, etc. Of particular interest are the tourist attractions associated with ethnocultural and spiritual properties of landforms, which are found in the special location of fortresses, monasteries, cave settlements, mounds. The Tarkhankut Peninsula has excellent diving facilities.

The above general features of the formation of geological and geomorphological monuments, the nature of the relationship of geological structure and relief, the causes, and consequences of such relationships, certain ethnocultural features of the regions, the distribution of individual geological and geomorphological monuments require methodological study and systematization.

The applied significance of such studies lies in the possibility of using their results in the tourism industry for the development of natural tourism. Important scientific tasks are also the search for locations, analysis of the origin, features of reflection on the earth's surface, the establishment of certain ethnocultural features of some geological and geomorphological monuments of Ukraine, and the development of methodological unity of the concept of "geological and geomorphological monuments". The topical issue is to ensure accessibility to these objects and to popularize knowledge about the origin and history of the part of the environment that is represented by geological and geomorphological monuments.

In addition to the characteristics of numerous geological and geomorphological monuments, in establishing their status, the issue of their protection, as well as preservation geodiversity of Ukraine, considering European experience.

It is important to establish the features of the dynamics of the environment to preserve geological and geomorphological monuments that are exposed to destructive natural and anthropogenic factors.

The development of information databases for monitoring geological and geomorphological monuments of Ukraine is urgent.

The applied methods of studying geological and geomorphological monuments are primarily due to the need to use the results of research in the tourism industry and for the development of natural-cognitive tourism. To this end, the authors have designed a textbook "Geological and geomorphological monument of Ukraine", which provides an analysis of geological and geomorphological monuments of individual regions of Ukraine and the phenomena that led to their formation. In the monograph "Relief Ukrayiny", the analysis of geological and geomorphological monuments of certain regions of Ukraine for the purpose of the fullest, but concise representation of these phenomena is carried out.

The first of them, the eastern – Donetsk region – contains an extremely large variety of geological and geomorphological monuments, due to the complex tectonic structure, an incredible combination of almost all genetic types of rocks, numerous contradictions in the history of geological development and landform, the richness of mineral resources, the presence of distinct morphological differences in relief caused by the spread of various denudation and accumulation processes, as well as intensive development of the economic activity. The combination of these features of the long-term terrain development has led to a clear exposure of numerous geological and geomorphological monuments on the surface. Examples are the remains of a unique volcanic structure from the time of Hercynian orogeny (Fig. 2) or the consequences of powerful denudation (Fig. 3).

Generations of scientists and specialists in the use of natural resources have broken spears here in search of the truth about the laws of natural development.



Fig. 2. Excavated dome of the Devonian volcano Maf-Haya, which is washed by the Stylyvskii Reservoir (foto S. Pidmohylnyi)



Fig. 3. Fragment of prepared exits of crystalline rocks – Fireplace Graves, Nazarivka village (foto S. Pidmohylnyi)

The plain, located in the west of Ukraine – *Podilsky Krai*, is marked by an exceptional wealth of geological and geomorphological monuments on the background of other plains of Ukraine. Undoubtedly, this is due to its close location to such an important fragment of the Alpine-Himalayan geosynclinal belt as the Ukrainian Carpathians, where the long and complex history of crustal formation is characterized by exceptional diversity. A wide range of geomorphological processes, both



denudation, and accumulation, led to the active transformation or conservation of various petrographic and lithological differences of rocks, carried out general or selective denudation as the processes of leveling the earth's surface at different times. Almost all monuments of the region are characterized by outstanding properties of various aspects of geological and geomorphological nature, which gives confidence in the methodological unity of the still disparate geological and geomorphological monuments. Here are the various genetic categories of ancient and modern morphogenesis, the numerous consequences of which have created exceptional in origin, content, and expression in natural landscapes geological, and geomorphological monuments (Fig. 4, 5), which create a rich spectrum natural places of interests for the plains of Ukraine. Outstanding historical events of the region are often reflected in numerous ethnocultural monuments, and long ago established logistical conditions provide easy access of tourist and recreational community not only Ukraine but also neighboring European countries to various parts of Podillya.

The Ukrainian Carpathians have long been a powerful region for various economic activities. Recreational, health and amateur tourism also account for a significant share. The Carpathians have always been known for their powerful therapeutic potential, and the cultural centers of the region (Lviv, Ivano-Frankivsk, Chernivtsi, Uzhhorod, Mukachevo, Drohobych, etc.) have repeatedly become centers of international political, economic, cultural, and educational, scientific meetings of the European elite. Also, mineral resources have always been extracted here. The powerful Ukrainian diaspora around the world has long been spreading information about the territory of the Carpathians, as waves of emigration to the West rolled mainly from this region of Ukraine. And today the largest share of scientific publications, methodological and applied developments in the field of international and domestic tourism in the Carpathian region belongs to Lviv, Ivano-Frankivsk, Chernivtsi and Transcarpathian



Fig. 4. Nyrkiv Canyon and the waterfall on the Dzhuryn River and near it – a unique outcrop with the contact of Devonian and Cretaceous sediments (foto V. Grytsenko)



Fig. 5. Stratotype of the lower Mukshin subsyite of the Bahovytska syite near the Bahovytsia village (foto V. Grytsenko)

scientists and educators. Geological and geomorphological monuments of the Carpathian region have played and continue to play an important role in growing interest in natural and ethnocultural features, especially during the independence of Ukraine and the intensification of its international relations. Thus, the relevance of obtaining new scientific information is obvious, and this section contributes to the further development of the nature-cognitive tourism (geotourism).

Numerous geological and geomorphological monuments in this region are of ethnocultural significance, such as the Uritsky rocks (Fig. 6).





Fig. 6. Urytski rocks – fragments of modern appearance and architectural reconstruction of the ancient fortress (rocks – massives and stones of the Upper Paleocene) (igotoworld.com)

*The Crimean Peninsula*, having a unique configuration of the coastline, washed by two seas, characterized by the presence in a relatively small area of different tectonic structures, experiencing complex events of alpine orogeny, transgression, and regression of the Azov–Black Sea basin, high land surface a wide range of exogenous geomorphological processes, has long been of strategic regional importance and the reputation of a unique climatic resort. Its complex political and economic history has always attracted the attention of various ethnic groups, which formed unique archaeological sites on the peninsula. Many of them are closely related to the geological structure and relief of the earth's surface, important paleogeographical ups and downs. Therefore, in the given list of geological and geomorphological monuments, there is a considerable share of the monuments closely connected with archeological aspects. A large list of genetic categories of geological and geomorphological monuments provides a variety of methodological and methodological approaches to the classification of monuments so that the Crimean Peninsula has always enjoyed the increased attention of naturalists. Most of the prominent geological and geomorphological monuments are available for study (Fig. 7) and are bright objects of geotourism.





Fig. 7. Three hundred meters denudation remnant tracts Cuesta-Buckle (Crimea) (solid mossy layer, over which lie nummulite limestone – Symferopil circle of middle Eocene) and fragments of natural and man-made landforms (foto E. Naumenko)

Much publicity about the characteristics of the nature of the peninsula was due to the names of prominent figures of science and culture, who spent on the southern coast of Crimea for much of his life, treated here, creating poetic, literary, and artistic masterpieces.

### Conclusions

The content of this article allows to draw the following conclusions.

1. Today there are many definitions of “geological monument”, “geomorphological monument” and “geological-geomorphological monument”, but they are a complex of concepts about these unique objects of natural origin. For example, such concepts as "geological landmark" are disclosed, which calls it a unique object (a set of interconnected objects) of natural origin, or areas that most fully and clearly characterize the course of geological processes inherent in each area and their results, or those characterized by scientific value and availability for direct inspection and study.

2. Geomorphological processes are manifested by various geological monuments on the earth's surface. Therefore, "geological and geomorphological monuments" are reflection in the forms of the earth's surface geological factors of their formation and the variety of influence of relief-forming processes, their dynamics, which determines the methodological status of most monuments as "geological - geomorphological".

3. Analysis of numerous attempts to classify geological, geomorphological and geological-geomorphological monuments shows that the category of natural phenomena "geological-geomorphological monuments" is characterized by significant conservatism compared to other components of the environment and therefore is a carrier of paleogeographic, ethnocultural, natural features, which gives them the status of attractive tourist attractions and contributes (along with the growing development of sports and adventure tourism, caving, underground urban subculture, diving, rafting, recreational rafting, jumping, sport fishing) to the development of the tourism industry in general.

4. An important reason for establishing the conservation status of geological and geomorphological monuments is the presence of formulated criteria for assessing the aesthetics of relief in Ukraine, for example, the uniqueness relief on the following grounds: genesis, forms, combinations with other elements of landscape, stability or dynamism, "imagery – photogenicity", emotional perception, attractiveness, ethnocultural significance.

5. Relief as a basic element of the natural complex and geological-geomorphological monuments significantly affects the nature of recreational activities. The article establishes the specificity and sequence of recreational functions of the relief of Ukraine due to the peculiar properties of endogenous, exogenous, and anthropogenic genetic varieties of recreational geological and geomorphological objects.

The spiritual function of geological and geomorphological features of the territory of Ukraine involves the consideration of a reflection of these features in folk art, in the works of painters, and the sacral function is determined by how religious buildings use the distinctive properties of geological structure and topography. They are built mainly on elevations, high plateaus with impregnable steep high slopes, or on sites in the upper reaches of the river basin surrounded by high and majestic slopes.

6. Ukrainian experience in the field of geoconservation of geological and geomorphological monuments is very modest, due attention is paid to these objects only in areas of varying degrees of protection, which indicates the need for more active work in this direction as industrial, educational, and scientific institutes and public organizations. Today there is some experience of paying due attention to geological and geomorphological monuments within natural and biosphere reserves, and the paper describes the characteristics of geological and geomorphological monuments as objects of the natural heritage of Ukraine. The professional community of the state should have closer contact with the public attention on similar issues and with the European Association for the Protection of Geological Monuments – (ProGEO).

7. The importance of preservation and protection of geological and geomorphological monuments is pointed out, which should establish the regularity and dynamics of the environment for forecasting the condition of monuments and developing the necessary measures to stabilize negative processes and possible restoration of objects. The role of natural factors of changes of geological and geomorphological monuments and features of anthropogenic influence on the state of geological and geomorphological monuments are studied.

8. Considerable attention is paid to the analysis of information bases of monitoring of geological and geomorphological monuments of Ukraine and conclusions are made, that creation and the subsequent functioning of geological and geomorphological monuments require obligatory monitoring of their condition. They also need scientific support that would provide systematic and regular supervision of natural monuments, assessment of their condition, modeling and forecasting of changes, as well as advisory and methodological support of all stages and types of work on their preservation. The main principles according to which the system of collection and analysis of monitoring information on geological and geomorphological monuments should be designed are continuity, stationarity, analytical, openness. The technological platform of the system of information and analytical support for the monitoring of geological and geomorphological monuments is based on an integrated

approach and includes the advantages of both database-oriented and GIS-oriented technological platforms. The information and analytical system for monitoring geological and geomorphological monuments belong to the class of large systems with significant volumes of outgoing and internal data. Therefore, for storing such arrays of information, as well as organizing quick access to them, industrial database management systems (MS SQL Server, Oracle) are used. One of the main subsystems of the information-analytical system is a geoinformation system, which is a software-information environment for input, storage, manipulation, modeling, analysis, display, and presentation of various cartographic, aerospace, and attributive data on the state of geological geomorphological monuments.

Thus, this review of sources about the geological and geomorphological monuments of Ukraine, according to the authors, reflects the level of knowledge about the Geoheritage of the state and can serve as a basis for the introduction of nature-cognitive tourism as a new scientific direction in the Earth sciences.

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