A B S T R A C T S

GEOLOGY

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ESTIMATION OF OIL AND GAS POTENTIAL OF BLOCKS NEAR THE BRYGADYRIVKA SALT DIAPIR BY USING NEOTECTONIC CRITERIA

The problem of search for new perspective structures near the salt diapir which are possible hydrocarbon traps is discussed in this article.

Presentable statistical data which were received by previous researchers in different oil-and-gas provinces, confirm dependence between neotectonic activity of structural forms and parameters of their oil-and-gas content.

Therefore, the use of neotectonic criteria is expedient on the search stage of oil and gas structures.

Direction, speed and amplitude of the newest tectonic movements are reflected in features of landscape, heights of relief, picture of a hydrographic network.

The definition of the Brygadyrivka salt diapir border and the results of forecasting perspective near the salt diapir blocks which are hydrocarbon traps using landscape indicators have been described in this article.

The authors used the V.P. Filosofov's morphometric method to characterise neotectonic movements of the Earth's crust.

Graphic decomposition of relief on the abstract surfaces of different orders (by R. Horton) and their mathematical processing (construction of maps of differences or maps of gradients) are basis of this method.

The location of neotectonically-active structures was predicted by using integrated processing of all morphometric maps and results of visual landscape-geoindication interpretation of topographic maps. The sign, total amplitude and gradient of neotectonic movements were calculated for the predicted structures and blocks.

The authors noted that the oil and gas fields were characterized by average values of amplitudes and gradients of neotectonic movements.

These neotectonic characteristics were used to rate the oil and gas potential of predicted structures.

Keywords: neotectonic criteria, oil and gas content, landscape - geoindicative decoding, morphological structure, morphometric method of V. Filosofov, salt rod, structural and geomorphological studies.

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SYSTEM ORGANIZATION OF CONSOLIDATED BASEMENT'S DISJUNCTIVE TECTONICS IN DNIPRO-DONETS PALEORIFT

The article presents the character occurence study results of rocks meso-fracturing planetary system in the Dnipro-Donets paleorift crystalline basement (DDP). It has statistically consistent spatial net orientation, unchangable under further transformations of geodynamic field tensions in the earth's crust and serves as a primary grid for formation of any type and rank within the geostructures. Statistical analysis of azimutal planetary net array in the crystalline basement of DDP on the cartographic and circle rose-diagrams was carried out. By its results six pairs of mutually orthogonal fracture systems diagnosed as regional fault system were identified. Paragenetic and Kinematic analysis of identified regional fault systems using field data of

tectonophysic study of similarly oriented transregional faults on the adjacent geostructures – Ukrainian Shield, Voronezh anteclise, Donetsk folded structure was carried out. As a result of the analysis four genetic types of structure paragenesis was identified, which correspond to four main geodynamical conditions of tectonic deformations found in the region. Among them two regional structure-forming rift parageneses developed in the north-western diagonal fault system in azimuths were identified. By the results of carried out reconstruction of main axis of tensors paleotension fields' characteristics of spatial-time realization on the DDP planetary regmatic grid and field of geodynamical tensions of earth-crust were identified. These data made the model base for systematic organization of consolidated region's basement fault tectonics. Results of carried out study has allowed to establish: 1. regional shift mechanism of system tectonic faults activation in the crystalline basement, resulting in formation of four main regional structure types of paragenesis, determining main traits of system basement architecture organization. 2. Spatial-time parameters of one-directional process of paleotension field inversion: shift of main compression and decompression axis performed counterclockwise with azimuthal period-15 per one geological stage that has led to its summarized shift on 60 in the phanerozoic geotechnology. 3. geotectonic regularity of geodynamical evolution of earth-crust DDP, consisting in the formation of four main regional-structure plans in the structure of sedimentary sheath: 1) paleozoic 2) paleozoic-mezozoic 3) mezozoic-cenozoic 4)recent cenozoic, which is on the formation stage. Overall study results in the formalized view are presented by the scheme of the earth-crust geodynamic evolution of DDP.

Keywords: tectonics, fault, basement, shift, planetary net, geodynamics, region.

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FLUID-DYNAMIC MODEL OF HYDROCARBON ACCUMULATION IN SALT-STRIKE-SLIP STRUCTURES OF THE DNIEPER-DONETSK DEPRESSION

The article examines the problems of Geology and petroleum potential of a new type in the tectonic structures of salt-strike-slip structures (SSSS), established by the author in the Dnieper-Donetsk depression (DDD).

Depending on geodynamic conditions strike-slip within the salt dome shaft are formed of a convergence (compression) and divergence (stretching) zone. Inside these zones areas of transtension and transgression are allocated. These sections meet five morphogenetic types of salt-strike-slip structures: Chutivsky, Vesnyansky, East-Medvedovsky, Melikhovskay and Kochubeevsky.

Developed a fluid dynamic spatial model of hydrocarbon accumulations formation in SSSS allows to predict migration paths of hydrocarbons and allocate traps in natural reservoirs. In the formations of deposits in SSSS a decisive influence have the processes of horizontal compression and horizontal strike-slip. These processes are the basis for fluid-dynamic models of hydrocarbon deposits based on the structural features of SSSS. It covers: 1) the formation of decomposition zones as the source and useful volume for accumulation of hydrocarbons; 2) following upward vertical migration of fluid flows of loosened zones on plots of shear tectonic dislocations; 3) the formation of hydrocarbon traps under reliable salt confining beds. The important factor in the localization of hydrocarbons in the SSSS is a complex tectonic dislocation where a significant role is played by areas of ancient deep faults, which are channels for the fluid heat and mass transfer.

It is established that traditional gas condensate field is characterized by: a secondary reservoirs of fractured-porous type; component two-phase (gas-condensate); united gas-water contact controlling massive sheet deposit; maximum overpressure in the roof deposits under salt lid and anticlinal, mass of reservoir traps. In fields dedicated to SSSS, characteristics of oil and gas are: a wide range of reservoir types with depth; a wide range of phase state of hydrocarbons; absence of a common gas-water contact; multilayered type deposits; the absence of abnormally high reservoir pressure peaks; reservoir types in combined non-anticlinal traps.

Keywords: deposit, horizon, field, trap, reservoir, strike-slip, salt- strike-slip structure (SSSS), fluid-dynamic model

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GEOLOGICAL FACTORS IN THE FORMATION CONDITIONS OF TRAPS IN THE ORCHYK DEPRESSION PERM DEPOSITS OF DNIEPER-DONETS BASIN

A variety of screens has been examined theoretically, their screening and limiting functions in hydrocarbon traps formation have been demonstrated. Among their variety as main ones we regard covering and bottom fluid-proof rocks, disjunctives, salt-bodies, hydrodynamic pressure, etc. Place of screens development and their crucial (screening) and secondary (limiting) functions in trap generation were observed. Screen role in deposits and oil and gas field trap forming of Orchik depression uplifts (Upper Carboniferous and Lower Permian rocks apart) were specified. Significant difference in trap types of the series was demonstrated. Leaving out singular exclusion, non-arch lithologic, disjunctive and salt-dome screened and limited traps are most typical for Lower Permian rocks, while Carboniferous traps are mostly screened and limited quasiarch.

The research results, based on virtual data of field studies in detal, are evidence of all the types of screens in the research territory's wide spreading. Their trap generating and trap limiting role makes it possible to define traps and fields type. Essential part of traps is non-arch.

Variety of traps are caused by screens of different types which act as separate factors, could form complex with others and can be reliable basis for prognosis of similar conditions. Such conditions can exist not only on uplifts but also on monoclines, near-salt-stocks zones and synclines.

Keywords: structure, screen, trap, deposit, field, screening, disjunctive, lithology.

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REGULARITIES OF BITUMEN HYDROTHERMAL ASSOCIATIONS IN GEOLOGICAL STRUCTURES OF WEST DONETSK GRABEN

Accommodations of bitumen-hydrothermal associations in geological structures of the West of Donetsk graben have been studied.

It has been stressed that the main tectonic elements of the region are long-lived deep faults. The main role is played by the fault intersection zones of different directions, which are associated with the processes of heat and mass transfer. They appear in the hydrothermal mineralization, new and modern tectonic movements, heightened tension of the thermal field, as well as the ascending discharge of endogenous gases, hydrocarbon fluids and deep water formations.

It is established that a characteristic feature of the region is the presence of bitumen-hydrothermal associations' anticline that presents ore in areas of rocks decompression (mercury and mercury-polymetallic) as well as barren mineralization, and on the other hand- bitumen.

According to the author, the main reason for such an existence in the geological space is, above all, general migration routes of mineralizing fluids of different geochemical specialization.

An educated guess is that the main geological-structural and geochemical features of the West Donetsk graben were formed in the Laramide phase of the Alpine orogeny, which caused a significant intensification of heat and mass transfer processes, resulting in the formation of hydrothermalites that closely co-exist with a variety of hydrocarbon compounds - from methane gas to solid solutions .

Keywords: bitumen-hydrothermal associations, hydrocarbons, hydrothermalites, geological structures, heat and mass transfer, fluids, migration, deep rift, graben.

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MICROFOSSILS DISTRIBUTION IN THE CALLOVIAN SEDIMENTS OF THE NORTH-WESTERN PART OF DNIEPER-DONETS DEPRESSION

The results of micropaleontological research of sponge spicules and foraminifers from the Callovian sediments in the north-west part of Dnieper-Donets depression are showed here. Spicules of sponges and foraminifers complexes of Lower, Middle and Upper Callovian sediments are described. Analysis of foraminiferal complexes allowed to allocate foraminiferal zones (Lower Callovian - zone Haplophragmoides infracalloviensis; Middle Callovian - zone Lenticulina cultratiformis – Lenticulina pseudocrassa and Upper Callovian - zone Lenticulina tumida – Epistomina elschankaensis) and note their characteristics. New morphospecies of sponge's spicules have been set in the study area for the first time. Analysis of sponges' communities' spicules enables us to assume that in the Middle and Upper Callovian basin there were sponges of Geodidae, Pachastrellidae, Tethyidae families of Tetraxonida type, and the Haliclonidae family of Cornacuspongida type. The presence of the Farreidae family sponges, Hexactinosa subtype, Amphiscophora type is also possible. In the Lower Callovian basin probably existed sponges of such families as Geodidae, Theneidae, Plinthosellidae, Haliclonidae, Axinellidae, of Hyalospongiae type and possible representatives of Amphiscophora type of Hyalonematidae family, as well as the Farreidae family of the Hexactinosa subtype. Gradual change of sponge spicules and foraminifers complexes is traced from the Lower Callovian to the Upper Callovian. The paleontological characteristics of the Callovian sediments are completed by the new data of spicule and foraminifera analysis. Ostracods and small bivalves in the complex are found. This allowed to study the biostratigraphic characteristics of the area supplement. The lithological characteristics and regularities of microfossils distribution made the existence conditions of sponge spicules, foraminifers, ostracods, bivalves small mussels possible in Callovian paleobasin reconstruction.

Keywords: spicules of sponges, foraminifers, ostracods, bivalves small, Callovian sediments, Dnieper-Donets depression.

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DEVELOPMENT FEATURES OF CALCAREOUS NANNOPLANKTON IN SOUTHERN AND EASTERN UKRAINE IN CRETACEOUS PERIOD

For the Cretaceous sections in eastern and southern Ukraine some changes in taxonomic composition and quantitative ratios between certain species of calcareous nannofossils have been found. The sections: north-west of Donbass, Dnieper-Donets Basin, Black Sea Depression, the plain and the mountain Crimea and Black Sea shelf were studied. A completely unique stage of nannoplankton development has been noted in Cretaceous period. At that time this group reached both qualitative and quantitative maximum development. During the period, basic taxonomic core of its evolutionary development was formed, which almost completely extincted at the end of the period. Development of the Cretaceous nannofossils suggests three major stages: Berriasian – Aptian; Albian – early Turonian; Turonian – Maastrichtian, degree of conversion complexes on the boundaries of these stages are much lower than at the boundaries of the Cretaceous period.

The boundary of Jurassic and Cretaceous is conducted with the appearance of Nannoconus steinmannii minor. There were significant changes in the taxonomic composition of cretaceous nannoplankton, as compared to the Jurassic. Moreover, if there is practically no change in the Coccolithales order, then in Nannolithales we note the first order, and then a sharp increase in both the number and variety of species.

During the Berriasian period taxonomic diversity of nannoplankton increases.In Berriasian-early Valanginian time there is flourishing Nannoconus, against which Podorhabdus role gradually increases. Late Valanginian-Barremian is time of nanoflora's stable development. The complex is dominated by Podorhabdus. In the Aptian nannoplankton gets rock-forming role. The acme embraces all the Lower Cretaceous groups, aside from the Nannoconus. In the Albian-Cenomanian the nannoplankton complexes are structured. The groups that were dominating in the Early Cretaceous lose their importance, they do not become extinct, however. New groups characteristic of the Late Cretaceous replace their predecessors.

In the Turonian-Santonian, the nannoflora was the most stable. At this time there is not any new family, the rate of genera and species appearance is reduced. In the Campanian, family Arkhangelskielaceae ap-

peared and swiftly won a dominating role. During the Campanian-Maastrichtian, this family evolved quickly enough. The evolution ended just at the late Maastrichtian. At the boundary of the Cretaceous and the Paleogene all the Cretaceous groups became practically extinct. We spotted the transition of six species only.

The data on the stratigraphic position of 132 species, 59 genera, 14 families: Chiastozygaceae, Eiffellithaceae, Rhagodiscaceae, Stephanolithiaceae, Axopodorhabdaceae, Biscutaceae, Mazaganellaceae, Prediscosphaeraceae, Watznaueriaceae, Arkhangelskiellaceae, Kamptneriaceae, Microrhabdulaceae, Nannoconaceae, Polycyclolithaceae. Each family is given a brief description of the changes in species composition during the Cretaceous period.

Keywords: calcareous nannoplankton, Cretaceous, evolution, eastern and southern Ukraine.

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UNDERGROUND WATER AS FACTOR OF SUSTAINABLE REGIONAL DEVELOPMENT

Sustainable development assumes, first of all, the steady growth of life quality of the population that means consecutive satisfaction of compelling social (human) needs. From this it follows that the importance of a natural resource for sustainable development of the region is determined by its public functions, that is, those requirements which it satisfies. Proceeding from it, as a subject of the analysis we chose underground water resources which have a wide range of satisfaction of social requirements. Underground water resources are necessary as an instrument to ensure human activity and as industrial and technological materials.

The aim of the research is to analyse the role of underground water as a component of natural resource potential of the territory in transition to a regional sustainable development model.

Underground waters are one of the most important natural resources of the territories which can become the determining factor in the regional sustainable development. It is promoted by the fact that, as is shown above, underground waters are used to satisfy a wide range of social requirements, such as individual biological requirements, improvements and preserving health of each person, social recreational requirements, need for water for engineering procedures and technical purposes, soils melioration and agro-industrial production, as mineral resource.

Keywords: natural-resource potential of territory, social needs, sustainable development.

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QUALITY OF THE GROUNDWATER AQUIFERS IN ALLUVIAL DEPOSITS AND QUATERNARY AQUIFER COMPLEX IN EOCENE-PLIOCENE IN KHARKIV REGION

The article analyzes the quality of drinking groundwater aquifer alluvial sediments and Quaternary aquifer complex of Eocene-Pliocene intakes in Kharkiv region. Data of the previous studies on the assessment of drinking groundwater quality have been analysed. The comparison was made between values of groundwater aquifer's chemical composition in alluvial sediments and Quaternary aquifer complex of Eocene-Pliocene period of intake according to standards DerzhSanPiN 383-97 "Drinking Water". This made it possible to assess macro- and micro-components in existing groundwater withdrawals. Chemical composition of drinking groundwater was considered within the main fields of Kharkiv region from the approved reserves of groundwater intakes exploiting these underground water aquifers. The average forecasted supply of groundwater resources per capita in Kharkiv region is about 1.29 m^3 / day, corresponding to 6 place in Ukraine, operating reserves - 0.33 m^3 / day, corresponding to 10th place among the regions of Ukraine. Groundwater was explored in 28 fields with 50 intakes. There are total for Ukraine 435 989 deposits withdrawals. In absolute figures Kharkiv region belongs to the areas with the most proven operating reserves of groundwater. The number of approved operational reserves was 1047.87 thousand m^3 / day. Groundwater reserves were approved only in 15 districts of 27. In total, there are more than 3.1 thousand wells in the area.Withdrawals from the alluvial aquifer of Quaternary sediments is 0,062 thousand m^3 / day, corresponding to 0.7% of total water intake value. Withdrawals bearing complex of Eocene-Pliocene is 0.975 thousand m^3 / day, corresponding to 4.0% of forecast resources value on the horizon and 11.3% of total water intake.

Keywords: drinking groundwater quality, alluvial aquifer of Quaternary sediments, aquifer complex of Eocene-Pliocene, indicators of chemical composition, deposits of underground water, intakes, macro and micro-component composition, Kharkiv region.

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ON SOME PECULIARITIES OF CARBONATE ROCKS SUFFUSION

The features of carbonate rocks suffusion are considered in the article. On the example of Upper Cretaceous marl-chalk strata exposures in the southern part of Svyatogorsky brachyanticline the authors have showed that suffusion is the result of physical (mechanical) activity of infiltration water forming a solid surface and subsurface runoff. The most important component of suffusion is a solid flow module calculated on the basis of monitoring data. Its value depends on the climate, geology, manifestations of modern tectonics, lithology and hydrogeology of the research areas.

It has been revealed that suffusion processes in the marl-chalk stratum not only lead to denudation of carbonate rocks, but also increase the intensity of water exchange in them. The authors have experimentally proved that suffusion development is subject to the dynamics of infiltration waters in different seasons of the year, therefore the most intensive process takes place in spring and autumn.

During the field studies we have found out that the power of suffusion processes depends on the relief nature as one of the main natural factors regulating their direction. Geomorphological features of the territory determine the speed of filtration water flows, conditioning the intensity of mechanical destruction in the rocks in the weathering zone. This relief erosive energy depends on the erosion base depth and the shape of slopes.

Suffusion processes in the study area develop on the background of recent tectonic activity of Petrovsky-Kreminian fault connected not only with the disintegration of the carbonate rocks in the mountain range, but also with recent rise of the territory. Upward development of the relief is accompanied by an increase in the denudation processes capacity and, consequently, an increase in their influence on the earth's surface, rocks and soils. From the point of view of geomorphology, recent suffusion is manifested as morphologically young cup-like shapes, suffusion channels, ravines, gullies, suffusion landslides, etc.

At the stage of carbonate rocks suffusion development characterized by fragmentation of the particles to the colloidal size, we observe transition of purely physical (suffusion) processes into chemical (karst) ones in

the system "rock - water", which meets one of the basic laws of nature on the transition of quantitative changes into qualitative ones.

Keywords: suffusion, carbonate rocks, infiltration water, solid flow, denudation, geodynamic water flow, relief.

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INCREASE OF FLOW RATE IN GAS WELLS WHEN USED INNOVATIVE STRUCTURAL AND THERMAL INSULATING NANO-COATINGS

At the late stage of gas condensate fields' exploitation deterioration of hydraulic and gas-dynamic efficiency of jointing flowline pipe lifts and gas collectors leads to the decrease in total flow rates in pattern

wells. There are many technical ways to improve a hydraulic efficiency of complicated gas collecting systems in gas condensate fields.

As for the thin coatings with specific thermo-physical, geometrical and structural properties, there is an opportunity to have more simple solutions to optimize hydraulic efficiency of pipe system and particular pipeline sections. The most popular methods of field experience include smooth, turbulence-insulating and turbulizing coatings.

The fact to be focused on has become the result of calculations - a significant increase in computational and theoretical well production in complex application of special (two or three) coatings in comparison with separate coatings applied.

The base application object is averaged well in Mashevsky field in Poltava region in Ukraine. The general description of the field is following: the average depth of productive horizons is up to 4 km; the length of particular gathering lines up to 2.5 km; the used FCP diameter- 63 mm; the reservoir temperature - 70-80 degrees Celsius and wellhead pressure-s 1-3 MPa. The wells work quite steadily with the consequent pressure reduction at the wellhead and in the layer.

Simplified modelling is based on known equations by Darcy, Bernoulli, Adam, Weymouth, Shukhov and Reynolds. The basic equations were taken in a non-linear form with proven simplifications in field experience that significantly reduced the computing time and made it possible to solve problems in a general setting. In this case the use of three main surfaces is considered: smooth, heat-insulating and turbulizing. Most parameters and initial data are typical for Ukrainian deposits with an average value of stocks.

Nonlinear equations systems solution given by a mathematical model of non-isothermal lifting in condensate wells is done by using advanced algorithmic techniques in Mathcad program, by rank-Kut 4th order with the addition developed by the authors of the initial and boundary conditions in accordance with the physical sense.

Downhole lifting studies were made using developed mathematical models by objects of Mashevsky development, which showed a good value for the simulation adequacy and close agreement between calculated and measured thermometer, manometric and flow-measuring parameters.

Keywords: gas production, compressor, thermal gradient, well, insulation, surface roughness, coating.

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BIOSTRATIGRAPHY OF THE MIDDLE JURASSIC OF CENTRAL AND EASTERN PLATFORM UKRAINE

The new paleontological data are supplemented by a stratigraphic scheme of the Middle Jurassic in the eastern slope of the Ukrainian shield, the Dnieper-Donets Basin and the north-western part of Donbass. Middle Jurassic sediments stratification of a platform Ukraine was conducted through various groups of fauna and flora. Namely, in the article the full spore-pollen complexes and complexes dinocysts are considered. Other groups, such as the remains of fungi, cuticles, tracheids, acritarchs, microforaminifers, remains of insects, etc., are also characterized by deposits microfossils. In this study, sediment samples from boreholes (wells) and outcrops cutting through Mid-Jurassic, Bajocian, Bathonian, Callovian successions of central Ukraine (the eastern slope of the Ukrainian shield) in the western region of Dnieper-Donets Basin and the north-western part of the Donbass, were analysed palynologically. Over 20 genera of dinocysts have been identified and they represent a wide range of forms; planktonic marine, planktonic coastal, benthic coastal, and freshwater specimens. The taxonomic identification of the dinoflagellate cysts and their vertical distribution enables to recognize six dinoflagellate assemblages from Middle Jurassic: Assemblage I (upper Bajocian – presence of the dinocysts Pareodinia sp., Pareodinia evitti, Gonyaulacysta helicoids); Assemblage II (uppermost Bajocian – Zona Acanthaulax crispa); Assemblage III (lower, middle Bathonian. – Zona Ctenidodinium combazii–Ctenidodinium sellwoodii); Assemblage IV (middle, upper Bathonian and lowermost Callovian – layers with the dinocysts Pareodinia spp., Ctenidodinium spp.); Assemblage V (the uppermost lower- and middle Callovian – Zona Ctenidodinium ornatum–Ctenidodinium continuum); Assemblage VI (upper Callovian – strata with the dinocysts Ctenidodinium ornatum, Batiacasphaera sp., Chlamydophorella sp., Cleistosphaeridium sp., Epiplosphaera sp., Atopodinium sp., Occisucysta sp, Leptodinium sp., Cribroperidinium granulatum, Dapcodinium sp., Nannoceratopsis sp., Acanthaulax senta, Cyclonephelium sp., Dapcodinium sp., Pareodinia sp., Aldorfia sp.). As a result of a palynological analysis we have established seven spore-pollen complexes for middle Jurassic sediments found in wells and outcrops within the central and eastern parts of Ukraine platform.

Keywords: Bajocian, Bathonian, Callovian, spore-pollen complex, dinocysts, acritarchs, cuticles, tracheids, microforaminifers, Ukrainian Shield, Dnieper-Donets Basin, Donbass.

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FENITE HALOS OF GEOLOGICAL-GEOCHEMICAL FEATURES OF PROSKURIVKA AND CHERNIGIVKA'S ALKALINE-ULTRAMAFIC MASSIFS OF UKRAINIAN SHIELD

Geological, petrographic and, mainly, geochemical features of two massifs of Ukrainian Shield's alkaline-ultramafic formation – Proskurivka alkaline (PM) and typical carbonatite Chernigivka (ChCM) are reviewed. Both of them belong to two different structural-morphological types (ChCM – linear, PM – central) and differ by rock complex (carbonatites absence in PM). Petrographic and geochemical features of two massifs fenite halos that differ by form and various compositions of host rocks have been investigated. It was found out that the fenitization process in both research cases, except on some similar features, lead to geochemically different final products formation – fenites. Moreover, the last ones differ significantly by their geochemical features from massifs of alkaline rocks. It allows to assume that fenitization process was initiated by the so-called "forward wave" fluids, which outrun the introduction of alkaline rocks properly. In this case geochemical difference between PM and ChCM fenites is evidence of significant distinction in corresponding fenitization fluids composition and potentially contains the information to be estimated.

Keywords: alkaline-ultramafic formation, fenitization, fenite halo, alkaline rocks, geochemical features, "forward wave" fluids.

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SUITABILITY OF GREEN PLANTINGS FOR RECREATION IN THE CITY OF KIYV

Analysis of the existing conditions of green plantings of Kyiv showed forming types of vegetation, multifunctionality of green spaces in cities and the main directions of their use for recreation. Green plantings of the city of Kyiv according to the functions are divided into plantations of general, limited and special purpose and form the basis for primary natural vegetation – pine forest, pine-oak forest and hornbeam-oak forest. Along with the aesthetic, sanitary and microclimatic functions - recreation is one of the leading functions of green plants in cities.

Spatial analysis of the intensity of green plantings indicates the increase in the proportion of green plantings per unit area from the natural planning axis of the city (Dnieper riverbed) to the peripheral zones of the city. The green areas of the city have united transport with residential areas and are used for daily, weekly and, in some cases, seasonal recreation not only by this particular area, but also by residents of surrounding districts.

Short-term weekly and seasonal recreation is implemented through the organization of rest in campings, which may include an overnight stay, or just a variety of sports and recreational activities, sightseeing tours and daily short-term rest in the form of a utilitarian recreation, picnics, skiing, biking and hiking.

Criteria for recreation evaluation methods of green plantings in the city to determine recreational suitability are based on the biomedical, environmental, aesthetic, technological approaches.

The criteria for determining recreational suitability of green plantings in urban space are identified after landscape features; the type of vegetation that forms the basis of green plantings in urban parks and wooded areas; accessibility, architectural and infrastructural features.

Gradation of suitability for recreational use is the following: suitable for relaxation; favorable; partially favorable; areas of natural reserves and green areas recommended for special recreation (different types of utilitarian recreation, etc.). The analysis results of the vegetation types and infrastructure of the city indicates that most of Kyiv's green plantings areas are categorized as favorable and conducive to recreation.

Keywords: green plantings, categories of green plantings, types of natural vegetation, evaluation methods for recreation, recreational suitability.

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STRATEGY OF CARPATIAN REGION'S ECONOMIC POTENTIAL EFFICIENCY IMPROVEMENT

This article analyses the ways to increase the economic household usage efficiency strategies in the Carpathian region. The efficiency of strategic administration usage of economic potential in the Carpathian region is stipulated by the provision of human harmonious development, its personal level and welfare, creation of the corresponding conditions to achieve ecologically safe, socially oriented economic development. The author gives her own definition of the strategic administration of economic potential development as a set of measures, tools and factors of influence on the regional development in accordance with the strategy achieved by the common efforts of authorities, business and public institutions. As a result, we achieve the sustainable development of the regions and states in general, and a competitive position in the global market. It has been established to improve the strategic efficiency of the Carpathian region's economic potential regional authorities must have a certain set of information. The author points out that the regions of Ukraine, including the Carpathian one, have formed fragmented scientific and practical strategic forecasting and administration in various areas of economic activity which has both positive and negative aspects. The positive is the possibility to implement the best world leading practices for our country, and the negative is the lack of a common vision and predictive management activities in this area regulated by various acts, and fragmentation in teaching and methodological procedures for development of plans, forecasts and strategies at the national and local levels. The author notes that the strategic management of the region's economic potential development needs to assess the potential including the status, efficiency and formation based on the application of a SWOT-analysis, which includes the analysis of strengths, weaknesses, and opportunities and threats. Next, the opportunities to improve the potential are analysed, as well as formation of the optimal structure based on the potential synergistic interaction of its structural components in accordance with the strategic goals.The development strategy of the potential is based on the selected alternative development of the region, monitoring and evaluation of its implementation to achieve the objectives.

Keywords: economic potential management efficiency, Carpathian region, strategy, vision, strategic management, operational management.

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SPATIAL DISTRIBUTION OF CLIMATIC INDEXES ON THE TERRITORY OF FOREST-STEPPE AND STEPPE OF THE LEFT-BANK UKRAINE

The features of average monthly air temperature distribution, monthly rainfall and the ground atmospheric pressure on the left-bank Ukraine during a year have been examined in the article. With the help of cluster analysis regularities of spatial changes in basic climatic indexes during a year for the period from 1951 to 2000 have been determined. North Atlantic influence on climatic characteristics of the studied territory has also been investigated. By means of statistical analysis the changes in temperature condition are specified on the territory of Kharkiv region for the period from 2001 to 2014. By means of cluster and component analyses climatic fields of average monthly air temperature values, monthly rainfalls and atmospheric pressure have been studied at 38 stations for the year in the second half of the last century. The cluster analysis is an heuristic algorithm based on the Euclidean distances determined with predetermined threshold values. Further study of the climate of Ukraine, as a component of the global climate, will identify features and rate of change of meteorological parameters. Cluster analysis characterizes the same type of districts on temperature conditions, moisture regime and atmospheric pressure within the limits of forest-steppe and steppe of the left-bank Ukraine. In autumn there is leveling of the climatic field of atmospheric pressure: northern district embraces almost all the territory of forest-steppe and steppe, displacing the southern to the coast of the Azov sea. Within the limits of Luhansk and Donetsk regions the south-eastern district recommences. Analysis of the average monthly values of air temperature on the presented territory have shown two main districts in an autumn-winter period: northern and southern, the border between them passes on the line of the north-west of Luhansk region, the north of Donetsk and the south of Dnipropetrovsk regions. It takes place near the barometric axis of Voyeikow, which is defined by atmospheric circulation. In a spring-summer period when the main value has the feature of laying surface, in forest-steppe and steppe of the left-bank Ukraine a local district is formed on the territory of the Azov-Donetsk ridge.

Keywords: air temperature, atmospheric precipitation, atmospheric pressure, cluster analysis, statistical analysis.

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SOCIAL AND GEOGRAPHIC ANALYSIS OF THE MIGRATION PROCESSES IN KIROVOHRAD REGION

The research covers social and geographic peculiarities of the migration processes in Kirovohrad Region from 2005 to 2014 where the negative tendencies of the main kinds of migration were observed during the indicated period. The basic indicators such as: migration turnover, ratio of arrival and departure intensity, general ratio of migration intensity, ratio of turnover intensity, have been also calculated.

Kirovohrad Region has the biggest negative general ratio of migration decrease per 10,000 of current population which makes -8.6. The smallest migration turnover was observed in 2009 and comprised 26,180 persons. The biggest one was observed in 2012 and made 35,109 persons. General ratio of migration intensi-

ty of all streams was changing from -5.1 in 2005 to -0.9 in 2014. The tendencies for the ratio increase were registered in interregional migration and ranged from -5.0 in 2005 to -1.2 in 2014. In international migration this index varied from -0.14 to 0.36. A group of districts with negative migration balance was singled out. They are Vilshanskyi, Dobrovelychkivskyi, Znamianskyi, Novoukrainskyi, Ustynivskyi, Oleksanderivskyi, Oleksandriiskyi Districts. A considerable positive migration balance is characteristic only of the most economically developed one, Kirovohrad District. Interregional migration streams are directed to Dnipropetrovsk, Kyiv, Odesa, Cherkasy Regions. The biggest migration gain was from Donetsk and Luhansk Regions in 2014 due to internally displaced people.

The international migration of Kirovohrad region population is characterized by the rates growth of migration increase from negative indicators in 2005 (-153 persons) to positive in 2014 (360 persons). During the recent decade the main donor countries of migrants have been Russia, Moldova and Transcaucasian nations: Azerbaijan, Armenia, Georgia. The main recipient countries of Kirovohrad migrants were the United States of America, Russia, Germany, Israel.

The age structure of the migrants in the region is characterized by the predominance of working age people 76–80 per cent of the total number of migrants. Graphics and diagrams have been made and based on the respective calculations.

The main factors of migration in our region are those describing the living conditions: natural and geographic, economic, environmental, etc. An important factor for the region is also active irreversible outflow of students to study in other parts of the country.

To reduce the extent of the migration negative impact on the socio-economic situation in Kirovohrad Region it is necessary to conduct a long-term migration regional policy and the local government reforms.

Keywords: Migration, migration processes, causes and consequences, intraregional, interregional, interstate migration, ratio of migration intensity.

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DEVELOPMENT OF WASTE DISPOSAL EFFECTIVE TECHNOLOGIES BY POWER GENERATING AND CHEMICAL INDUSTRIES

The article describes the conditions and characteristics of accumulation of large-capacity waste from fuel and energy complex and chemical industry in the Ukraine. Technological preconditions of large amount of large-capacity waste accumulation in the industrialized regions of Ukraine are described and a consistent trend of growth is revealed. It is indicated that industrial wastes often contain heavy, rare and rare earth metals in amounts that give the opportunity to appreciate them as technological fields. The experience of using large-capacity waste from fuel and energy complex and chemical industry in the EU and the USA is analysed.The trends to accumulate toxic industrial wastes at enterprises of Ukraine for the past 15 years have been considered. It has been established that the utilization of ash and slag valuable components requires knowledge of chemical and phase-mineralogical composition of the waste, which is determined by the composition of the mineral part of the initial fuel and way of burning. The waste is in ash and slag producing enterprises of the fuel and energy complex which are kind of the hub of the items contained in the fuel. The composition of the ash waste was studied taking into account characteristics of the coals in Donbass. It is established that the use of the Ukrainian coal leads to additional environmental problems related to high content of sulfur and ash in coal. One of the solutions to the problems is the technology of extracting vanadium from ash waste. EU countries have experience of using phosphogypsum. The use of phosphogypsum as an additive in mortar has proved efficient, especially in the manufacture of decorative plates and large size sheet materials for decoration. Investigations of the waste composition have been carried out on the territory of the plant "Crimean Titan". It is revealed that the production of gypsum binders and phosphogypsum products on their basis is economically feasible, which in this case is not treated as waste but rather as secondary raw materials. Standard characteristics of phosphogypsum used as raw material have been identified. The flowcharts of phosphogypsum use with economically viable payback period 2-2.5 have been built.

Keywords: industrial energy, chemical industry, large-capacity waste, recycling of valuable components, environmental protection, toxic waste, rare and heavy metals, phosphogypsum, technical vanadium oxide, a hardware-technological scheme, building materials and products.

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ASSESSMENT IN LOESSES' INTENSITY GLEYING NORTHWEST BLACK SEA REGION OF UKRAINE

To qualitatively and quantitatively assess the intensity of gleying loesses in the depression morphostructures a ferrous module which is the ratio of FeO to Fe_2O_3, is most often used. But it is not quite correct and reliable. Its main drawback is that colloid compounds of ferrous iron formed by excess wetting are very unstable and quickly oxidize.

According to the results obtained in the course of complex research on the bearing sites of the Northwest Black Sea region micro- and petrogenic components in gleying loesses were marked. The main rock-forming minerals and chemical elements in the hydromorphic gleying soils, in the rocks of a transition zone and in the woods have been determined. In order to characterize the composition of macrocomponental gleying loess soils we defined the rows of chemical elements and petrogenic components of loess rocks. The contours of the depressional morphosculptures revealed both positive and negative low-contrast half-elemental

geochemical anomalies. The best way to highlight these anomalies is to use multiplicative indexes and coefficients. These geochemical indicators and petrogenic coefficients are formed on the basis of major components series and chemical elements. Indicators and ratios are calculated both for individual samples, and for average concentrations of chemical elements in loess stratum, the transition zone and gleying loess soils in the saucers contours.

The rows of chemical elements reflecting the relative migration intensity or accumulation in the process of gleying loesses were received. Chemical elements' behaviour which are contrast by their properties was characterized. Migration of chemical elements and their concentration in the geological bodies of gleying was studied.

New principles and characteristics of gleying loesses intensity qualitative and quantitative assessment have been developed.

Keywords: Northwest Black Sea region, depressions morphosculptures (saucers), degraded loesses, gleying, petrogenic, components, microcomponents, the intensity of migration and accumulation, geochemical criteria, qualitative and quantitative assessment.

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LANDSCAPE AND ENVIRONMENTAL PLANNING AS THE BASIS FOR ADMINISTRATIVE DECISION-MAKING ON ECOSYSTEM SERVICES

The concepts of ecosystem services (ES) and indicators of landscape planning must be linked with models for decision-making in ecological management. The author analyzes an increase in an applied orientation of geographical and environmental studies, the possibility to use landscape ecological planning for the development of administrative decision-making on ecosystem services. Based on the analysis of landscape planning models and ecosystem services that exist in Europe, fundamentally different models have been developed to characterize the Ukrainian features. In these models ES indicators become part of landscape ecological planning as a means of assessing the current state of the environment and determining how it might change in the future.

Key segments of the model have been highlighted to ensure the adoption of the correct management decisions on the provision of ecosystem services. It has been well-grounded that the landscape and environmental planning provides basic information about both the ecosystem capital, and the limitations of its use in a particular area. Cyclical model of the administrative decision-making implementation proves its viability in the market conditions.

This model provides further justification for the relevance of ES in decision-making planning, and confirms that ecological objectives do remain of prime importance.

Study focuses on innovations in integrating ES indicators in planning practice, comprehensively considering the whole range of ES and potential indicators. The case study shows how landscape ecological planning can benefit from differentiating between offered ES, basic needs, and utilized ES.

Keywords: landscape, landscape planning, landscape and environmental planning, ecosystem services, model, management decision.

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ENVIRONMENTAL SAFETY OF ASSOCIATED WATER RESERVOIR AND IODINE PRODUCTION

The iodine production process from associated water reservoir at the gas condensate field in Ukraine with different salinity from 10 to 200 g/dm^{3}are studied. The mixture ratio between iodide and bromide ions in solutions is 1:16. Ozonation is implemented in tubular-type reactor with intensive dispersant. Ozone is produced on the plant GL 3189. The plant productivity is $6.63 \cdot 10^{-2}$ m^3/hr of air. Ozone level is $6.28 \cdot 10^{-2}$ g-mol/m^3. Dependence of conversion degree changes of iodide ions into iodine from molar ion ratio is calculated. It is proved that during ozonation 20% of the formed iodine is removed from the reaction zone by air. It is confirmed that during iodine extraction from gas condensate fields water by ozonation method, the rate of iron conversion (II) to iron (III) increases which reduces the time of arrangement to return the produced water in the bowels of deep horizons. The developed mathematical model and pattern allows to calculate the degree of iodine formation when changing the molar ion ratio of reagents in various concentrations of iodide ions. The obtained results can be used to create safe technology of iodine production from the associated water reservoir. The produced water arrangement method of returning it in the bowels significantly reduces the water retention time to ensure the ecological safety.

Keyword: deposit, water, iodide ion, iodine, ozone treatment, time, ratio.

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CARTOGRAPHIC MODELLING OF AGROECOSYSTEMS' ECOLOGICAL STATE

The results of the agrarian and landscape ecosystem conditions have been highlighted in the article. According to them a state enterprise territory of the educational experimental farm "Dokuchayevs'ke" around a private enterprise "Pererabatyvayuschyy plant" and the data on the accumulation and distribution of a number of heavy metals mobile forms on the lands of agricultural destination have been studied. It has been proved that the most dangerous for human and animal health pollutants of natural environment are heavy metals. They do not decompose in the surroundings, but they accumulate in the tissues of living organisms. Getting into the plants, heavy metals can influence negatively on the metabolism processes. That finally leads to the decreasing yields and threatening to pollute the food chain.

Deterioration of the soil quality, reducing its biological value, self cleaning ability causes a chain reaction. This reaction can lead to a variety of health disorders among the population. In case of prolonged harmful effects water quality depends on the soil conditions and it always reflects the biological condition of the given soil. This especially applies to the ground waters because their biological value is essentially determined by the properties of soil, the ability to self cleaning, its filtration capacity, the composition of its microflora, microfauna, etc.

During investigations it was stated that the accumulation of harmful substances occur in the areas with a low relief of the territory as well as on a short distance from the nearest road. Thus, mathematical models of heavy metals in the soils have been made on the basis of these results.

Nowadays, the experience of both cartographic and geoinformation modelling of natural environment is promising in Ukraine. New methods and developments in this field could significantly simplify and open up new horizons in the solution of agrosystems' pollution problems.

Keywords: geoinformation modeling, GIS-projects, digital elevation model, heavy metals, agroecosystem, landfill, municipal solid waste.

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CHLORORGANIC PESTICIDES MIGRATION IN GROUNDWATER OF SOUTHERN BAHMUTSKYI BASIN

Migration of organochlorine pesticides in groundwater, occurring in the process of general mass transfer in the area of hypergenesis in Bahmutskiy basin has been considered. Some of the main parameters of pesticide distribution system "soil - water" (water chemistry, particle size and mineral composition of soil, etc.) have been determined as well as their accumulation on geochemical barriers.

During field studies of pesticides migration in loamy-sandy soils a stable pattern of their increasing concentrations with the temperature growth in groundwater has been established.

It is established that the intensity of molecular diffusion of pesticides increases with increasing porosity of the soil system, soil moisture, temperature increase. It is noted that the significance of molecular diffusion for agricultural chemicals migration, including pesticides in the underground hydrosphere and, as a result - contamination of groundwater - should be considered only at short distances from the source of contamination.

It has been found out that the role of molecular diffusion can be very significant when calculating the pollution front moving on long distances calculated in kilometers. It is envisaged that diffusion mechanisms provide mass transfer between the cross-cutting and dead end pores in soils and between permeable and im-

permeable layers of mineral matter. Thus, in the first case diffusion slows the spread of pesticide pollution, and in the second case - on the contrary - it accelerates it. This is a universal model for heterogeneous (fractured-porous and layered) soils. It has been noted that in some soils homogeneous by structure and texture water migration of pesticides occurs according to a certain scheme of convection-diffusion mass transfer, but in the case of large filtration speeds the priority are hydro dispersion processes that by external signs resemble diffuse scattering.

Cyclical migration of organochlorine pesticides in groundwater has been established conditioned by physical and chemical properties of the soil, organochlorine pesticides themselves and sorption-desorption processes that take place in the system "soil - water".

Keywords: pesticides, soils, groundwater, sorption- desorption processes, molecular diffusion.

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INFLUENCE OF TECHNOGENIC FACTORS ON ECOLOGICAL AND HYDROGEOLOGICAL CHARACTERISTICS OF THE CRETACEOUS WATER INTAKES IN NORTH-EASTERN DONBASS

The article deals with the impact of coal mines closure on the mode and conditions of the underground drinking water formation on the example of Cretaceous water intakes in north-eastern Donbass. Some facts related to the given problem are analyzed. It is said that both natural and technogenic factors influence on the mode of underground drinking water. The information about main natural and technogenic factors is presented. Particular attention is paid to the characteristic influence of the technogenic factors, taking into account the natural ones as well. It is emphasized that the main factors of technogenic influence on the drinking underground water in north-eastern Donbass are: mining and processing industry, mine drainage and operation of underground water intakes. The article focuses on the review of the last two factors. It is said that the technogenic factors are the catalysts of natural processes. The main processes in the rock mass by the influence of "wet" conservation of coal mines are characterized. As an example, we have analysed the ecological and hydrogeological situation on Svitlichanskyi Cretaceous water intake. Water intake is selected as the most significant in terms of the overall impact of natural and technogenic factors, as well as the observed changes. To compare the effects, the impact of technogenic factors on another Cretaceous water intake – Zhytlivskyi is shown.

Keywords: technogenic factors, natural factors, underground water, water intake, mine water drainage, groundwater mode, coal mines.

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STUDY OF TECHNOLOGICAL IMPLEMENTATION OF ENVIRONMENTALLY FRIENDLY NATURAL GAS ADSORBTION DRYING PLANTS

A significant number of the gas and gas-condensate deposits in Ukraine are at their final stages of operation, where adsorption method of natural gas preparation in terms of dew point temperature moisture is the most appropriate. Application of this method does not require significant capital and operating investments, it can be used at low values of working pressure; at the same time it makes it possible to significantly decrease dew point temperature with negligible loss of pressure in technological lines of gas preparation. It should also be noted that this method ensures high environmental indicators that are being achieved while using adsorption technology since this type of drainage is a wasteless and environmentally friendly process that eliminates pollution of the environment.

The article studies benefits of natural gas absorbtion method application. Technical modes are analysed and the results of experimental studies on technological schemes optimization of plants adsorption for high quality natural gas preparation are given. To optimize a technological scheme of the typical plant for natural gas drying, the technological modes of operation have been analysed, calculations for gas supply for three options of gas fuelling regeneration to the main drainage line have been performed, and experimental studies that have confirmed the feasibility of the proposed method of natural gas drying have been conducted. The proposed optimal way to apply the design of technological scheme will ensure the required quality of natural gas dehydration throughout the project cycle of adsorption, minimal moisture load on the adsorbent, and prolong its service period as well as assure high environmental performance during this process.

Keywords: adsorption unit, technology system, regeneration gas, dynamic capacity adsorbent, environmental performance.

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