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IMPROVED FORECASTING AND MONITORING OF SEVERE WEATHER PHENOMENA USING RADAR AND LIGHTNING DETECTION METHODS ON THE EXAMPLE OF AN INDIVIDUAL THUNDERSTORM CELLS

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This article presents a review of researches of electrical parameters as the precursors of severe weather. It's shown, that timely detection and identification of natural hazards, the adoption of measures to protect them, to ensure the safety of life of the population in the protected area depend on early warning systems and remote sensing.

To date, warning has reached a high level of speed and mass, therefore improving methods of forecasting and monitoring of development of dangerous weather phenomena based on the detailed study of the interrelated and interdependent parameters becomes currently the most important scientific problem.

Among these parameters it is possible to allocate a special group of electrical parameters which are the precursors of micro-structural changes in the clouds and accordingly predict their evolution. Therefore, the study of thunderstorm activity and the development of operational high-tech monitoring system of thunderstorms in modern conditions, is becoming an important area of research. It is in addition applied scientific purposes allows to solve many problems for all industries, from the design of the engineering structures, ensure the safe operation of various objects, reducing the economic damage from lightning phenomena to ensure life safety of people that is the basis for successful development of all sectors of the economy.

The work is a comprehensive study of microphysical and electrical processes in the atmosphere by the example of an individual thunderstorm cells using active-passive set of geophysical monitoring FSBI "HGI", consisting of a network of weather radar and automatic sensors lightning detection - LS 8000.

Keywords: lightning detection, storm center, weather radar, life safety, dangerous weather phenomena.

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ABOUT SECURITY WITH TARGET INFORMATION OF ENVIRONMENTAL MANAGEMENT OF MOUNTAIN TERRITORIES (A STUDY OF THE KARACHAY-CHERKESS REPUBLIC)

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Object and subject of the research - mountain territory of the North Caucasus and planning of state environmental management for sustainable development.

The purpose of the study - quality and quantity assessment of information that is relevant for optimization of environmental management and nature management of mountain areas at regional and local levels.

Research methods. Cross-spectrum analysis of cartographic, textual information of nature and content of rural master, basin concept.

Conclusion. The greatest amount of information relevant for environmental management at regional and local levels on the territory of the Northern Caucasus, is accumulated by geological organisations (lithogenic basis composition and structure, geomorphology, geocological maps and geochemical anomalies, etc.) and water management enterprises (energy company «RusHydro»). On the example of the Karachay-Cherkess Republic it is shown that the urban General plans (compiled in 2010-2012), include two planning object: populated area with an area of 20-30 hectares, and imparted to it mountainous area from 10 to 1090 km². These two characteristics contain insufficient relevant information. It is necessary to limit the scope of architects, with settlements area, and make landscape planning by ecologists on vast mountain territories. Work organization in this way will be congruence with the landscape planning concept developed for Russia by the international professional team (Antipov and others, 2002).

Keywords: environmental management, environmental engineering, basin geosystems, management, relevant information.

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ANALYSIS OF ADMINISTRATIVE-TERRITORIAL STRUCTURE OF THE KARACHAY-CHERKESS REPUBLIC

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Subject of the research - administrative-territorial structure of the Karachay-Cherkess Republic (KCR).

The purpose of the study - the analysis of the administrative-territorial structure of the KCR to determine spatial relationships of river basins and administrative regions, drainage and transport networks; estimation of the compactibility of the regions territories.

Research methods. Integrated landscape-geoecological approach using basin concept. Applied field method and interpretation of space and aerial images, GIS technology (ARCGIS 9.3.1).

Conclusion. KCR cedes to the most regions of the Russian Federation (area – 14.1 thousand km², inhabitants (447.6 thousand) and number of administrative regions (10). Most of the regions in the European part of the country has an area in the range of 50-200 km² with an average number of administrative districts - 28. The administrative structure of medium and high-mountainous parts of the Republic reflects the morphology of river basins within 4-6 orders of magnitude, as the drainage divides of the basins were the leading options for choosing boundaries of the districts. Spatial structure of transport network is determined with erosion pattern. The most roads location coincides with the most accessible sections of the river valleys - surface terrace. Erosion and transport network is a significant factor of the economic development: the vast majority of human settlements located in river valleys, and the largest of them are located along the federal highways. The Republican center of Cherkessk dedicated to the intersection of two federal highways and railways. The compactness of the districts territories increases with in decreasing sea level. At the same time height of the terrain above sea level does not affect the population of administrative centers. A dramatic difference of zoning districts and different principles of their names (ethnic and geographic) are not conducive to economic development.

Keywords: *administrative-territorial structure, morphological structure, river basin, geographical parameters, basin geosystem.*

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MODERN ASSESSMENT OF THE HYDROCARBON POTENTIAL AND RESOURCE BASE OF REPUBLIC OF KALMYKIA, SUPPLEMENTED THE NEWEST GEOLOGICAL AND GEOPHYSICAL DATA

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We consider the geological and geophysical data obtained by subsoil users in the twenty-first century, and petroleum potential of the Republic of Kalmykia. It is noted that the subsoil of the republic were studied on a competitive auction basis and domestic and foreign oil and gas companies.

It analyzes the geological and geochemical data complex on the composition and properties of the original organic matter of rocks, nature and conditions of oil and gas potential of the tectonic development of the region. It was revealed that the hydrocarbons accumulation is fixed in two main areas of generation: Kuma-Manych deflection and south-western part of the Caspian depression. Also not ruled out the hydrocarbons generation in the Triassic rift within the shaft Karpinsky. Taking into account the geological and geochemical characteristics of the structure and the formation of deposits, given the forecast of hydrocarbon allocation. It is possible to substantiate the main perspective directions of exploration for oil and gas in Kalmykia for stratigraphic complexes and territorial basis. The author of the article designed maps of oil and gas potential for productive and promising deposits. Maps have become the basis for modern quantitative assessment of the Kalmykia resource base. The evaluation was performed by the method of comparative geological similarities with the release of each complex reference sites deposits and transfer of specific resources on the measured density of the territory with similar coefficients.

These results confirm that a significant portion of the Kalmykia resource base remain unaccounted for. The further geological study of the area, since it is possible that its resource potential is much larger than is represented by researchers at the moment.

Keywords: Republic of Kalmykia, assessment of the hydrocarbon potential, resource potential, resource base, geological and geophysical data, exploration activities.

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STRUCTURE AND DYNAMICS OF THE DAUT GLACIAL AND HYDROLOGICAL COMPLEX IN KARACHAY-CHERKESSIA

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In the course of the pilot studies and the quantitative assessments of mountain geosystems and separate glaciers of Karachay-Cherkessia increase in intensity of reduction of the modern freezing is more and more contrastly shown. Glaciers lose habitual outlines. During the period, from 2001 to 2015 the most intensive process of a melting of glaciers and activization of exogenetic processes is noted. Increase in summer rainfall reduced amplitude of temperature fluctuations and increased intensity of a melting of glaciers on action by fluid settlements. During the winter period, decrease in solid rainfall did not compensate the part of a glacier which melted for the summer period, i.e. for the studied period the negative balance of many glaciers took place – the expense exceeded ice accumulation.

Warming of climate and change of local circulation of airflows, the bound to regional economic activity, in our opinion, are the defining factors forming structure of the modern freezing.

Daut Glacier as most exponential of remained on Side Range in Karachay-Cherkessia is brought in work the existential analysis of more than century dynamics of a glacier. Trends of the hydrothermal mode of middle mountains of the republic are presented. The cause and effect characteristic of changes of geomorphological indexes of a glacier, formation of the mountain lake, change of structure of a glacial and hydrological complex is given. Results of the conducted researches can be of interest to experts in the field of sciences about Earth, naturalists, guides of mountaineering.

Keywords: glaciers, mountain lakes, glacial and hydrological complex, hydrothermal indicators, trends, geomorphological characteristics, dynamics, glacier tongue, ablation, dammed lake.

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GRAVIMAGNETIC PERTURBATIONS AND EARTHQUAKES

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Specific features of the gravimagnetic perturbations observed in the structure of geophysical fields accompanying the development of seismic process are considered. Analysis of the observational data on variations in Earth's magnetic field prior to and along with strong seismic events has been carried out. It has been emphasized that certain features of the observed waveforms originate in the course of preparation of the studied seismic process before the main event. The frequency variation for the mentioned waveforms depending on their temporal proximity to the main seismic event has been revealed. Examples of the registered variations in magnetic field prior to significant earthquakes occurred on-shore and at the ocean bottom are presented. The first example illustrates a gravimagnetic perturbation recorded by the instruments at the Geophysical observatory in Northern Caucasus in the course of preparation and development of the March 19, 2009 earthquake in the Tonga Islands region. This seismic event features specific quasi-harmonic waveforms indicating the existence of the fluid-saturated dilatant structures of resonant type in the developing focal domain. Second example is related to a series of earthquakes that stressed Nepal starting from 25 April, 2015. The first and the strongest earthquake with magnitude estimated as of 7.5–7.9 has been followed by the aftershock with magnitude 6.8. Just before these seismic blows, the magnetic background has begun to increase in the region monotonously in four hours prior to an earthquake. Thus, on the basis of numerous instrumental observations the appearance of gravimagnetic perturbations in the time interval of 2–4 hours prior to strong seismic events is suggested.

Keywords: earthquake precursors, gravimagnetic perturbation, dilatant education, ULF magnetic field variations.

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DYNAMICS OF AIR TEMPERATURE AND PRECIPITATION IN THE CHUI VALLEY

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The study of the regional manifestations of climate change in mountain areas is of special significance, because it can refine the planetary picture. The dynamics of climate change has been studied through the use of long-term meteorological data (60 years). Chui basin considered as an object. Established a steady warming trend, with a slight cold snap of the last decade, as well as the absence of significant changes in precipitation. The world community is seriously concerned about the increasing number of natural disasters, enormous damage from flooding droughts and fires, which are a consequence of the changes in the environment. This fact shows a clear trend of increased aridity of the territory, since the air temperature observed increase is not accompanied by a corresponding increase in precipitation. We conclude that the effective mean of prevention to the impacts of climate change is establishing and strengthening prediction of disaster and climate services systems.

Keywords: *climate change, Chui Basin, aridity of the territory.*

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