

## **ИСПОЛЬЗОВАНИЕ ГЕОИНФОРМАЦИОННЫХ СИСТЕМ В ПРОЦЕССЕ ОБЕСПЕЧЕНИЯ СЕЙСМИЧЕСКОЙ БЕЗОПАСНОСТИ**

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**Аннотация.** В статье рассматриваются такие вопросы, как применение современных технологий ГАТ на месторождениях, создание электронных карт на основе графических программ, использование и интеграция космических снимков. Приводятся решения и предложения по таким проблемным вопросам, как методология исследований, проектирование с использованием материалов дистанционного зондирования Земли, формирование баз геоданных и создание цифровых карт, инновационные методы создания сейсмологических карт и баз геоданных.

**Ключевые слова:** Геоинформационная система (ГИС), программное обеспечение, ArcGIS, сейсмическая карта, база данных, сейсмоактивные зоны, сейсмическое районирование и микрорайонирование, сейсмогенная зона, зона колебаний, активные разломы земной коры, изосейсты землетрясений, сейсмические станции, эпицентры землетрясений.

## **USE OF GEOGRAPHIC INFORMATION SYSTEMS IN THE PROCESS OF ENSURING SEISMIC SAFETY**

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**Abstract.** In this article, issues such as the application of modern GAT technologies to fields, the creation of electronic cards based on graphic programs, the use and integration of space photographs are presented. Solutions and suggestions for problem issues such as research methodology, design using remote sensing materials,

geodatabase formation and creation of digital maps are covered in innovative methods for creating seismological maps and geodatabases.

**Keywords:** Geoinformation system (GAT), software, ArcGIS, seismic map, database, seismically active zones, seismic zoning and microzoning, seismogenic zone, vibration zone, active rifts of the earth's crust, earthquake isoseists, seismic stations, earthquake epicenters.

**Introduction.** Cartographic representation of earthquakes observed in the territory of Uzbekistan, current trends of earthquake processes, evaluation of socio-economic and ecological consequences, as well as planning of measures to be taken against earthquakes that may occur in the regions of our country with a high seismic risk are considered to be one of the urgent issues of cartography and construction project systems today. In recent years, specific measures have been taken to protect the population and regions from seismic risk, conditions have been created for conducting scientific research in the field of seismology and seismic-resistant construction at the level of world requirements, monitoring the strained-deformed state of the earth's crust, assessing the seismic risk. and the material and technical base of the network of stations used for recording earthquake detectors was strengthened [5].

It is known that more than 70% of the population of Uzbekistan lives in seismically active areas of 8-9 points. Therefore, ensuring the seismic safety of the population is one of the urgent tasks.

**The main part.** Earthquakes are a product of geodynamic processes associated with the development of the planet Earth, and today there is no way to prevent them. Therefore, one of the main directions of the science of seismology is to conduct fundamental and applied research in order to pre-estimate the risk of an earthquake and reduce its harmful consequences. Therefore, ensuring the seismic stability and seismic safety of structures is one of the main and important problems in ensuring the stable social and economic development of the republic. It is important for the citizens living in such dangerous areas to know the nature of the earthquake, its


manifestation and propagation laws, and to have the ability to determine the necessary measures to reduce its losses. For this reason, serious attention is being paid to ensuring the seismic safety of citizens living in our country in accordance with the requirements of the current regulatory framework [2].





**Experience styles.** In world practice, protection against natural and man-made disasters, including seismic risk assessment of populations and regions, is of great importance today. Today, a number of scientific researches are being conducted in the world on the issue of forecasting earthquakes on the evaluation of endogenous geological processes, determining the stress-deformation state of the geological environment, and developing models of modern movements of the earth's crust. In particular, in countries such as the USA, Germany, France, Japan, South Korea, China, and Russia, special importance is attached to the use of data on movements continuously obtained from points in the international cosmogeodetic measurement system in modeling the deformation state of the earth's crust [ 3].

Creation of digital maps on the basis of modern GAT (geographical information system) is carried out on the basis of software. Using digital technologies making seismic maps of all regions of our republic, it is possible to achieve high results, such as ensuring the seismic safety of the population and the territory.

**Results.** Today, GAT is widely used in the field of seismology, as well as in all areas of economic and technical industries [4]. Based on the problems studied above, it is desirable to initially create a geodatabase of seismic events on a national scale on a small scale (1:50000). Then it is proposed to gradually upgrade to a large geodatabase with a scale of 1:2000 [7].

Table 1

No	Steps	Note
1	Creation of a generalized geodatabase for the republic	

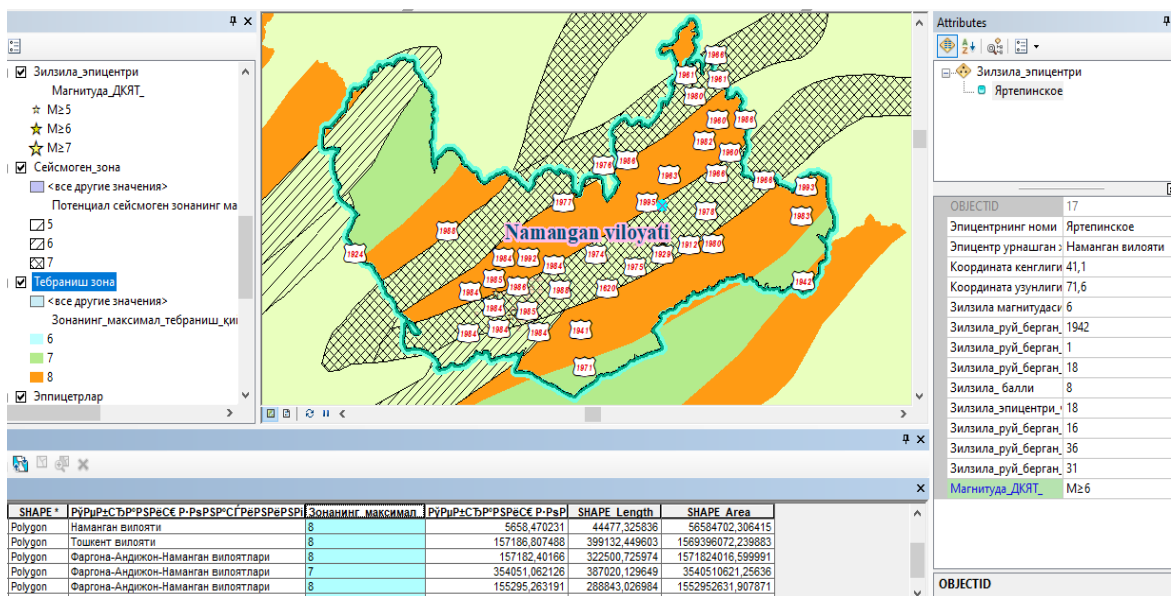
2	Download the basis of space photography of the existing territory of the republic	
3	Processing of data in Microsoft Excel (*.xlsx) format available at the Institute of Seismology of the Academy of Sciences of the Republic of Uzbekistan and materials available in the MapInfo graphic program	 
4	Forming a digital model of existing data based on the ArcGIS program	

As a result of the practical processes, a database and a digital map of common seismogenic zones and seismic objects will be formed (Fig. 1, 2).



**Figure 1. Digital map of earthquake epicenters (based on ArcGIS software)**

**Summary.** As a result of automation and modularization of this process, high efficiency can be achieved. This requires coding in ArcGIS. When the mechanism is launched, it will be possible to use the geodatabase on a large scale. Based on a common database and a digital card, it becomes possible to perform various analytical analyses. Based on the results of the analysis, it performs analyzes such as the most optimal route to evacuate the population to a safe place and the most optimal route for special teams to enter the scene to eliminate the risk, and provides high-resolution data provides



**Figure 2. Digital seismological map (based on ArcGIS software)**

Today, GAT is widely used in all areas of economic and technical industries. When using GAT, it is necessary to collect, store, process and deliver to users a large amount of written and graphical geographical data related to the area. Among other things, by modularizing the automated system of seismological data, we achieve the following efficiencies:

- increasing the use of modern techniques and technologies;
- high accuracy results;
- short-term information exchange;
- increasing the useful work coefficient;
- electronic data exchange;
- systematization of information in a database.

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