# JOURNAL OF ADVANCED SCIENTIFIC RESEARCH

ISSN: 0976-9595

Journal of Advanced Scientific Research (ISSN: 0976-9595)
Vol.5. Issue 1 page 10

# Editorial Team



**C/O Advanced Scientific Research,**
**8/21 Thamotharan Street,**
**Arisipalayam, Salem**

Journal of Advanced Scientific Research (ISSN: 0976-9595)
Vol.5. Issue 1 page 11

# HISTORY OF RESEARCH WORK ON EARTHQUAKE FORECASTING IN UZBEKISTAN

**Qurbonov Nodirjon Norboyevich**
Associate Professor of Tashkent State Pedagogical University
named after Nizami, Doctor of Philosophy in History

**Abstract:** One of the important problems facing scientists of the world, as well as seismologists of Uzbekistan, is the issue of early detection of earthquakes. Different views among scientists in the field of earthquake forecasting indicate that the possibility of detecting earthquakes in advance is increasing. Uzbek seismologists have been emphasizing that the possibilities of early detection of seismic processes are expanding. This article describes the history of the scientific research of Uzbek seismologists on earthquake forecasting.

**Keywords:** earth, earthquake, natural disaster, forecast, oil fields, water, human, disaster, tsunami, thermonuclear, history, seismology, reservoir, nature, society, seismic processes, republic, hypocenter, epocenter, universe, sun.

Humans have now joined these natural forces that have exerted their influence throughout the entire geological history of the Earth. As people use nature for their own needs, they continue to change the face of the earth. The creation of thermonuclear weapons, the opening of new oil fields, and the accumulation of water in large quantities in reservoirs are an additional burden on the earth. As a result, the force that has slowly accumulated over centuries in the interior of the earth sometimes suddenly starts to move - it causes earthquakes.

One of the ways to reduce the damages that can be caused by earthquakes is to study the occurrence of earthquakes in time and to plan preventive measures through it[1].

As a result of years of research, Sokha scientists have gained a lot of experience in studying large and small earthquakes and their causes. Scientists believe that most of the forces that cause earthquakes are usually at great depth, while earthquake hypocenters (epicenters) can also be near the surface. The closer the hypocenter is to the earth's surface, the stronger the earthquake, but it spreads over a smaller area. The deeper the hypocenter is, the greater the force of the earthquake is on the earth's surface and spreads over a larger area. The closer to the epicenter, that is, the hypocenter, the stronger the earthquake is above it. Usually, porous sedimentary rocks are present in the upper parts of the earth, while dense crystalline rocks formed under high pressure and temperature conditions lie in the interior. Cracks appear in places where some of the shells in the earth's crust are broken. Some large or small pieces of the earth's crust (blocks) move along these cracks. Such movement of large pieces can be the main cause of tectonic earthquakes. Such earthquakes are usually very powerful. Over the years, such earthquakes have been recorded day and night by thousands of seismometers on all continents, and opportunities for early detection of earthquakes are being sought.

[1] Кучли зилзилаларни прогнозлашнинг илмий асослари // Муҳофаза +. - 2012. - № 8 (94) – 19 б.

Another important problem facing the field of seismology is the issue of early detection of earthquakes as a result of research. There are different opinions about this until now. However, today we can see that the probability of detecting earthquakes in advance is increasing. Uzbek seismologists are of the opinion that there is an opportunity to predetermine seismic processes in this matter. Prediction of earthquakes is based on identifying their predictors in advance. According to Sokha scientist B. N. Strakhov, "Earthquake prediction is a stable structure of an unstable whole".

In general, an important task facing the field of seismology is to determine where earthquakes are likely to occur, and most importantly, to predict when an earthquake will occur. Of course, this issue is difficult and complex. Nevertheless, it is inevitable that this issue will find its solution in time[2].

Seismological scientists from Uzbekistan have done a lot of work on the issue of early detection of earthquakes as a result of research. The establishment of the Institute of Seismology of the UzFA led to the task of comprehensive study of earthquakes. At the same time, it was necessary to find a solution to the problem of protecting buildings and structures from natural hazards by studying their natural condition by zoning the earthquake-prone areas in front of the institute. To do this, to find out the causes of earthquakes, which have a long history, have affected human life for a lifetime, and have become one of the main problematic issues for them, as well as to determine in advance where, when and with what force, the Republic and the former Soviet Union scientists entered into cooperation. All conditions were created for seismologists to start such a big work. In response, seismologists have been able to study the causes of earthquakes and predict the strength and location of future earthquakes.

Also, scientists managed to prove that a significant increase in the chemical composition, temperature and pressure of surface water a few days before an earthquake is a sign of an earthquake. Uzbekistan seismologists made a great contribution to world science with this discovery.

We can say that scientists have been studying more seismically active areas for years, but not much attention is paid to landslides, landslides, and floods, which are secondary factors that lead to certain disasters in those areas. To date, there are no reliable methods for accurately predicting earthquakes. But great progress has been made in determining how strong or weak seismic activity is in this or that region. This is also very important because of the seismic activity of that region, it was possible to take some measures to prevent collapses and ensure the stability of construction objects[3].

Some seismologists believe that it is possible to predict the occurrence of an earthquake based on the slope of the earth's crust, its rise and fall. The tilting of the earth's crust before an earthquake was investigated for many years by the former Soviet scientist V.F. Banchkovskii. It should also be said that the earth's surface may not tilt before every earthquake. Some earthquakes can be followed by horizontal

[2] Мирзаев В. Зилзилалар. - Тошкент, 1966. – 4 б.
[3] Зилзилани олдиндан билса бўладими? // Тошкент оқшоми. - 1989. - № 23 (6.812).

displacements. But it is a very complicated and difficult matter to tell when these events reach the level, where, when and with what force an earthquake will occur.

Another of the indicators of an earthquake is related to changes in the electric field in a certain area. In this case, electric currents are formed in the earth's layers and in the air, the electrical resistance and electrical conductivity of the rocks change. In addition, pulsed electromagnetic waves are emitted from the epicenter of the earthquake. Uzbek scientists V. N. Mikhalkov and E. A. Chernyaevskiy discovered this process in 1924 during the Khurshab earthquake, 120 km from Jalalabad. watched from a distance. Later, such a situation was observed during the Hayit earthquake of 1949[4]. A sudden change in the electrical resistance of rocks was theoretically proven by the Moscow scientist O. Barsukov during the Garm earthquake in Tajikistan. Especially during the Garm earthquake, the electrical conductivity of the earth's layers became apparent.

Later, this method was developed by Greek scientists, and the concept of "Greek method" for earthquake prediction entered the science . According to him, the prediction of earthquakes is based on placing seismic stations close to each other.

In seismic pre-detection, a scientific conclusion is made based on the status (activation or vice versa) of the earthquake detectors detected as a result of seismic observations. However, in the seismology of Uzbekistan, although a number of cases of early detection of earthquakes were observed, no specific structure was formed in this direction.

Seismic early detection is of great importance in reducing and preventing losses from earthquakes, so research on seismic early detection in Uzbekistan began in 1968. Over the past years, in-depth scientific research has been conducted in Uzbekistan in this regard, and great achievements have been made in the history of world seismology.

Reliable predictors of earthquakes have begun to be identified [5]. For example, observations made by seismologists in 1965-1970 revealed that anomalous changes occurred in some areas of the earth's surface. It has been proven that earthquakes are caused by this.

Periodicity theory also plays an important role in predicting seismic processes. In this regard, Uzbek seismologists R.N.Ibrogimov and K.N.Abdullabekov studied periodic processes of strong earthquakes in Turkestan-Aloy, South Fergana, Kurshov and North Fergana regions in 1970-1971 and presented information about it. According to him, this period is 40 years.

Therefore, in September 1973, based on these data, according to the strict request of G. O. Mavlonov, director of the Institute of Seismology of the Russian Federation, Andijan and its surrounding areas were included in the long-term pre-detection zone. By the order of the Institute dated October 14, 1973, the department of the Andijan scientific-examination complex was established in the city of Andijan.

[4]The Eid earthquake. Encyclopedic encyclopedia. https://qomus.info/encyclopedia/cat-h/hayit-zilzilasi-uz/01.12.2020 .
[5] Иброхимов Р. Кучли зилзилалар изидан. – Тошкент, 1982. – 13 б.

The main task of this department was a comprehensive study of the changes occurring in the seismic processes here[6].

In 1970, at the initiative of the party secretary of Andijan region B.R. Rahimov, the deputy, the former deputy chairman of the scientific and technical state committee of the USSR A.N. Kirilin became closely acquainted with the work of the Andijan scientific inspection complex department.

When former USSR Supreme Council deputy A.N.Kirilin arrived in Andijan city, the responsible officer of Andijan scientific inspection complex department G.Yu.Azizov was called to the building of the regional party. At this time, the director of the Institute of Seismology G.O. Movlonov and the responsible staff also arrived. At the same time, an international symposium on seismic process indicators was being held in Tashkent with the participation of 14 countries.

A.N.Kirilin heard the information about the processes taking place in the seismic zone of Andijan and provided additional financial support to the department of the Andijan scientific research complex in 1975 for the further expansion of its activities [7].

Since 1976, permanent observation works have been started in the territory of Andijan region in 5 directions: hydroseismology, geophysics, topogeodesy, astrogeodesis and deformometric directions.

At this time, 3,000 pits were dug in Andijan in order to search for additional gas and oil deposits. 50 of them were dug to find underground water. Among these pits, 30 pits in different places were selected, and since 1976 regular observation works have been carried out. In Jalalabad and Khojaabad , equipment was installed to continuously monitor changes in the composition of underground water . [8]Quantitative change of radon substance in water was controlled[9].

The geophysical group began to continuously monitor the changes in the geomagnetic field with the natural electromagnetic pulse of the earth.
Topogeodetic group members to the Uchkurgan-Osh route to the southern Olamushuk modern vertical movements in the upper part of the earth began to be observed along the micropolygon. These observations were made continuously every 3 months.

In 1977, horizontal measurements were carried out 4 times a year by the astrogeodesic group, and from the beginning of 1978, they began to be carried out twice a month. Deformometric group from 1976 Andijan and southern Olamushuk direction established continuous monitoring of deformation processes[10]. The results of daily observation by the groups were analyzed in the center in Andijan city and the results were summarized. These efforts paid off.

That is, as a result of long-term preliminary detection, the Institute of Seismology of Uzbekistan was able to detect the strong Aloy earthquake that

[6] Проблемы сейсмологии Узбекистане // Научный журналь ИС им. Г. Мавлонова. - Т-I. – Тошкент, 2010. № 7. – 146, 147 б.
[7] Ibid., 148 p.
[8] Разумов Г.А. Подземные водохранилища. // Природа. - 1976. - № 3. – 62 б.
[9] Радон и его негативный фактор. // Муҳофаза +. - 2008. - № 8 (46). – 11 б.
[10]Ibid., pp. 146, 147.

occurred on November 2, 1978, 6 hours before its occurrence [11]. This earthquake occurred 120-140 km southeast of Andijan with a magnitude of 6.7. Due to the fact that the population was warned before this earthquake and necessary measures were taken, there were no victims of the natural disaster.

Today, one of the most urgent problems in the countries of the world is to reduce the harmful consequences caused by earthquakes. This problem will be solved by studying the laws of manifestation of earthquake sensors in geodynamic polygons . Using man-made objects as a natural model, it is possible to study the interrelationship between the preparation process of earthquakes in the regions and the manifestation of their indicators. It can be seen that exactly such studies were carried out in Tokhtagul, Chirkey, Talbingo, Nurek, Azat reservoirs[12].

Cattle The scientific research carried out in the area of the reservoir is large-scale compared to other regions, and it is distinguished by its duration in the world. We can see that several scientific literatures were published during 1973-2013 based on the scientific results obtained by Sokha scientists K.N.Abdullabekov, E.Berdaliev, S.Kh.Maqsudov, A.I.Toychiev and others [13]. The purpose of this research is that the Earth's magnetic field Charvoq It consists in studying the characteristics of local changes related to the volume and level of the water collected in the reservoir and modeling the earthquake preparation process in natural conditions, in the area where variable loads are generated. Since December 1973, geomagnetic research in the territory of Chervok reservoir has been conducted at 40 points and 122 observation points[14]. The results of the conducted research were calculated based on the data provided by the geomagnetic observations at the "Yangibozor" magnetosphere observatory. According to the calculated results, it was found that the change in the volume and level of the water collected in the Charvoq reservoir always causes a significant change in the magnetic field. Also, the results of deeper studies have clarified that not only the water level and volume, but also the seismotectonic processes around this area have a strong influence on the changes in the processes in the magnetic field. As an example, we can take the 7-point and 5-point earthquake in Tovoksoy, which occurred on December 6, 1977.

At the time of this earthquake, the local geomagnetic field was +5 nTl, another example is the 1980 magnitude 5.5 Nazarbek earthquake, the local geomagnetic field was +3 nTl, the next example was the 1982 magnitude 5.8 Chimyan earthquake +3.5 nTl can be seen to have changed. The results of scientific research carried out in the area of Chervok reservoir are aimed not only at modeling the process of preparation for earthquakes, but also at early detection of earthquakes, at studying the seismic activity of the Korjantov fault, and at monitoring the seismic condition of the city of Tashkent and its surrounding areas.

---

[11] Ibid., pp. 148, 149.
[12] Азимов А. Сейсмическая безопасность гидротехнических сооружений. // Муҳофаза +. - 2014. - № 11 (121). – 5 б.
[13] Юсупов В.Р. Геомагнит майдоннинг сув ҳажмининг ўзгариши ва зилзилалар билан боғлиқ аномалиялари. // XXI аср-интеллектуал ёшлар асри мавзусидаги республика илмий ва илмий-техник анжуман. – 30 март 2018. – 191 б.
[14] Юсупов В. Зилзила ва геомагнит майдон. // Вазият. - 7 январь 2016. - № 1 (535).

It should be said that there were scientists who did not believe in detecting earthquakes through detectors. At the international symposium dedicated to the Tashkent earthquake in 1974, the great Siberian scientist V. T. Soloninka denied the existence of such informants in his article. However, Uzbek seismologists continued their work after the Tashkent landfill, and began work at the Kyzilkum landfills in Fergana, Fergana Valley, and central Kyzylkum. Scientific research work on finding earthquake detectors has also been started in these landfills. The research site included a large area with a radius of 70-100 km.

Two strong earthquakes in Ghazli in 1976 required immediate special attention to this area. For this reason, for the first time in the former USSR, in 1977, the Decision of the Communist Party of Uzbekistan SSR "On Strengthening Seismology" was announced. According to this decision, it was decided to build observatories to predict earthquakes in all regions of the Republic [15].

In 1979, the Council of Ministers of the USSR adopted the Resolution "On Strengthening Seismology". In it, funds were allocated to the Ministry of Geology of the USSR - "Geological Intelligence" and the Institute of Seismology under the FA of Uzbekistan for the further development of monitoring of seismic processes. According to this decision, 1.5 million rubles will be allocated in the first year, and 2 million rubles will be allocated every year from the following year [16]. However, in 1977, academician G. O. Mavlanov initiated the "Earthquake Prediction Committee" for the first time in the former USSR in order to predict earthquakes.

Foreshocks are the process of multiple occurrences of weak earthquakes that herald a strong earthquake. Foreshocks also indicate that a strong earthquake is about to occur. However, not all strong earthquakes are preceded by aftershocks. For example, there was no aftershock in the 1966 Tashkent earthquake. As an example, aftershocks occurred before the Namangan earthquake on February 18, 1984. That is, there were earthquakes once or twice a day. A month later, the number of such forshoks reached 100-150 per day. The local authorities have been notified. As a result, an 8-point earthquake occurred. Because it was prepared in advance, there were no casualties or injuries. However, there were specific damages in buildings and structures [17].

However, in some literature, it is said that there were no lumberjacks before the 1966 Tashkent and 1980 Nazarbek earthquakes. It is found in some sources that there were certain reporting factors even before these earthquakes. For example, on April 26, 1966, people were awakened by an underground tremor and a flash of lightning over the city. On the night of the earthquake, other supernatural phenomena were observed. A few hours before the disaster, in some houses located in the epicenter of the earthquake, the fluorescent lamps of the daylight lamps began to turn on by themselves, and high electric charges appeared. In some houses, the inside of the wall was lit up blue, sparking from electrical wires that were close together but not touching. Or if we pay attention to another source, which is also written about the Nazarbek earthquake that occurred on December 11, 1980, in which: "...at 20:35

[15] ЎзР ФА. Ғ.О.Мовлонов номидаги сейсмология институи 50 ёшда. – Тошкент, 2017. 83-б.
[16] Абдуллабеков Қ. Зилзиладан сақланиш мумкинми? - Тошкент: Ўзбекистон, 1992. – 40 б.
[17] In the same place, 56 p.

local time, a strong earthquake of magnitude 7-8 occurred in Nazarbek, west of Tashkent city. Here a predawn was seen and an earthquake occurred. At first there was a rumbling sound like thunder from underground and suddenly there was a strong earthquake. The remote control of the Tashkent seismic station showed that it was a "strong earthquake". Its epicenter was located 15 km west of the city of Tashkent [18].

In the 1960s, S.A. Fedotov, director of the Institute of Volcanology of the Russian Academy of Sciences, put forward the theory of the temporal course method of seismic movements in the early detection of earthquakes. Accordingly, it was suggested that earthquakes can be repeated at certain intervals. Even now, this method is used for 70-80 percent of earthquakes in advance.

In addition, there are also hydrogeological indicators of earthquakes, in which the water level in wells decreases and then rises sharply, in which there is a change in water temperature, an increase in the amount of radon substance, carbon dioxide gas and mercury vapor in water.

This method proved itself in the case of the 1966 Tashkent earthquake. It was possible to predict several earthquakes through this method. Moscow researchers also tested the scientific results of Uzbekistan's seismic scientists in the field of early detection of such earthquakes in laboratory conditions and fully confirmed their validity. Based on this law, it was proven in the 1968 Dagestan and 1977 Isfara-Botkenda earthquakes. However, many earthquakes, in particular Tianshan in 1976 and 1999, Gazli in 1984, Spitak in 1988, Hisor in 1989 (the Sharora, Okulibolo, Okulipoyon village earthquake on January 23), Jigaristan in 1991, (the earthquake caused a landslide of 200 thousand cubic meters) 2001 It was not possible to predict the Indian earthquakes in the year. In addition, it was seen that there are certain deficiencies in the information collected in the field of seismology about the changes taking place in these areas.

Measurement of anomalous changes occurring in the geomagnetic field of Uzbekistan has been carried out since 1968. As a result, Uzbek seismologists made many achievements. Some of them have been proven for the first time in world seismology. This can include changes in the geomagnetic field.

Based on this experience, a magnetometric station was installed in the late 1970s and early 1980s for continuous geomagnetic monitoring around the Chervok reservoir, which holds a very high potential risk. It recorded changes in magnetometric conditions around the reservoir. According to the results of many years of comprehensive research, the main factor in the occurrence, development and spread of changes in the electric, magnetic, pulsed electromagnetic field are the active cracks of the earth and the properties of rocks.

In order to predict the occurrence of earthquakes, the Seismological Institute holds a meeting of the Earthquake Prediction Commission every Thursday.

This commission prepares a conclusion on the short- and medium-term seismic condition of the country. The Commission sends the information released as a result

[18] ЎзРФМИ. Зилзилаларни мониторинг қилишнинг истиқболлари ва ривожлантириш асослари // Илмий-амалий семинар материаллари. – Тошкент, 2018. – 58 б.

of summarizing the collected weekly information to the Ministry of Emergency Situations and other relevant organizations [19].

It can be said that during the past years, Uzbek scientists have made many achievements in predicting earthquakes. This plays a key role in ensuring the safe living of the population while preventing many possible losses in the country's economy. In particular, the adoption of the Cabinet of Ministers Resolution and Regulation No. 242 in a new version on August 24, 2011 led to the further expansion of the issue of advance notification of emergency situations. Such large-scale actions provide an opportunity to realize the extremely important task of ensuring the seismic safety of the territories and residents of our republic by predetermining the occurrence of earthquakes.

[19] Қурбонов Б. Зилзилани башоратлаш комиссияси // Муҳофаза +. - 2008. - № 5 (43). – 13 б.