International Academy of Science H&E

E.N.Khalilov

GLOBAL NETWORK OF FORECASTING THE EARTHQUAKES: NEW TECHNOLOGY AND NEW PHILOSOPHY

London

E.N. Khalilov. GLOBAL NETWORK OF FORECASTING THE EARTHQUAKES: NEW TECHNOLOGY AND NEW PHILOSOPHY. *London, SWB, 2009, 65 p.*

World Organization For Scientific Cooperation
WOSCO

The book is published in accordance with the decision of the Editorial Board of the International Scientific Publishing House SWB

E.N. Khalilov
GLOBAL NETWORK OF FORECASTING THE EARTHQUAKES: NEW TECHNOLOGY AND NEW PHILOSOPHY. London, SWB, 2009, 65 p.

ISBN 978-9952-451-03-0

In the book is described the positive experience of short-term prognosis of strong distanced earthquakes on basis of long-period gravitational harbingers.
Some information about Global Network of Forecasting the Earthquakes is presented.

ISBN 978-9952-451-03-0

London
SWB - 2009

CONTENTS

CHAPTER 1
FORECASTING OF EARTHQUAKES: THE REASONS OF FAILURES AND THE NEW PHILOSOPHY 5

Introduction 5

1.1. Registration of different harbingers in big distances from epicenters 7
1.2. Seismic-gravitational harbingers 7
1.3. Tideless variations of gravity 8
1.4. Geochemical harbingers 8
1.5. Seismic-hydro-geological harbingers 9
1.6. Seismic harbingers 9
1.7. Low-frequency three-dimensional variations of gravitational field 9
1.8. Classification of the considered "long-range" harbingers 10
1.9. What and how did the seismologists forecast heretofore? 10
1.10 About possible influence of tectonic waves on different properties of geological medium 11
1.10.1.General information 11
1.10.2. Gravitational harbingers of earthquakes 12
1.10.3. Geo-chemical harbingers of earthquakes 15
1.10.4. Hydro-geological harbingers of earthquakes 16
1.10.5. Seismic and acoustic harbingers of earthquakes 16
1.10.6. Electric, magnetic, electromagnetic, optical and other harbingers of earthquakes 17
1.10.7. Main reasons of inefficiency of classical methods of earthquake forecasting 17
1.11. Local harbingers of earthquakes 17
1.12. Long-range harbingers of earthquake 18
1.13. Fundamental mistake of seismology at short-term forecasting of earthquakes 18
1.14. What to do? 18
References 19

CHAPTER 2
STATION OF FORECASTING OF EARTHQUAKES "ATROPATENA": PHYSICAL PRINCIPLE AND THE FIRST RESULTS 21

Introduction 21

2.1. Methodology 23
2.2. Results 24
2.3. Conclusions 27
References 32

CHAPTER 3
Agreement on the Establishment of the International Scientific Cooperation Platform ICEP – INTERNATIONAL COOPERATION FOR EARTHQUAKE PREDICTION 35

CHAPTER 4
COMMUNIQUÉ on issues of Global Changes of Geological Environment "GEOCHANGE" for presentation to UNO, European Union, International Organizations and Governments of States 43

References 48

CHAPTER 5
HISTORY OF GLOBAL NETWORK OF FORECASTING THE EARTHQUAKES (Photo Album) 53

CHAPTER 1

FORECASTING OF EARTHQUAKES: THE REASONS OF FAILURES AND THE NEW PHILOSOPHY

Introduction

During the whole history of humanity the people have been trying to learn about possible natural cataclysms beforehand. It is mentioned in ancient historical sources, legends, myths and in religious writings. For this purpose they used all accessible for them opportunities in accordance with their level of knowledge and philosophy. They tried to use astronomical phenomena and they associated the natural cataclysms with them. For example, ancient people used to take the solar eclipses, approaches of the Mars to the Earth, appearance of spots on the Sun, unusual behavior of animals and unusual phenomena in atmosphere as special signs of approaching of the catastrophe.

How far have the modern scientists gone from their predecessors? If we try to make parallels, we'll see that the modern science with more interest studies the influence of planets of solar system, solar activity and other cosmic factors on seismicity and volcanism. Meanwhile, for short-term forecasting of the earthquakes are also used (as earlier) the different harbingers of earthquakes. The main difference is in explanations of the mechanism of connection between the observed harbingers and the process of preparation of the earthquake. Another main difference is the application of modern recording equipment, which uses high tech. In other respects "philosophy" of forecasting the earthquakes practically hasn't been changed.

The scientific researches, aimed at creation of effective technology of forecasting the earthquakes were financed for about 100 years in many developed countries of the world. Disappointment of public officers and wide mass of the population because of absence of serious achievements in this sphere can be understood. Seismologists, who forecast the earthquakes and spent billions of dollars in the whole world, found themselves in difficult and delicate situation. Most of them were looking for justifications of their scientific failures, and gladly found them during an international scientific meeting which was called in London on 7-8 November 1996 on the subject of interrelation of earthquakes with other phenomena in order to forecast them. Transactions of this meeting were published in Geophysical Journal International, vol. 131, pgs 413 to 533, 1997.

During this authoritative forum the famous seismologist Dr. Robert J. Geller declared the impossibility in principle of forecasting the earthquakes. His main idea is that the process of preparation of the earthquake source has a big probability of randomness and influence of many external factors. That is why he considers this process as a maximally approximate to chaotic processes. Many further articles and speeches of Dr. Robert Geller were the continuation of his idea about impossibility of forecasting the earthquakes. This idea is reflected in his basic statement: "Research in the sphere of forecasting the earthquakes have been carried out for more than 100 years without evident success. The results of researches didn't allow to receive the great achievements. The extensive researching was not able to find reliable harbingers. Our theoretic work supposes, that break displacement is nonlinear process, which is very sensitive to unknown details of structure of the Earth in bulk, and not only in immediate proximity to the epicenter. The reliable accordance of alarms about unavoidable strong earthquakes is inefficient and impossible" /9/.

What did Dr. Robert Geller achieve with his critical statements?

Firstly, he gave a perfect opportunity to the hands of "seismologists-pessimists" to "scientifically" avow their failures.

Secondly, he slowed down the development of science in the sphere of earthquake forecasting for more than ten years, as after his speeches "the epidemic of mass pessimism and scepticism" had come in the sphere of earthquake forecasting.

Thirdly, he divided seismologists in two enemy camps – the adversaries of earthquake forecasting and the adherents of earthquake forecasting.

The followers of Robert Geller published and publish now the articles which "prove" the impossibility in principle of earthquake forecasting /10, 12-15/.

As Robert Geller thinks "Modern theories of earthquakes consider that they (earthquakes, author's notes) are critical or self-organizing critical phenomena, which means the system which is kept on the border of chaos, with integral random element and the dynamics of avalanche, with strong sensibility to weak variations of stress."

Does Robert Geller really believe that a part of "chaos" in the process of display of all earthquake harbingers increases a part of strict regularity?

The matter is that the mistake in choosing the physical model brings to the mistake of all further mathematic models. Everything depends on correctness of the choice of "system of coordinates" or "reference frame". If your physical model is inside the system of coordinates where the physical processes are changed together with the system of coordinates, you will never "see" these processes. In order to see these processes you have to exit this system of

coordinates and go to another system of coordinates. This conclusion proceeds from the postulate of special relativity theory. We advise Dr. R. Geller and other critics not to forget this postulate of special relativity theory.

We don't want to say that Dr. Robert Geller and his followers are not right at all. Our assertion is that these statements are true only for one type of earthquake harbingers – local harbingers. But the point of view of Dr. Robert Geller and his followers isn't kept for long-range earthquake harbingers, which we'll talk about below. Meanwhile, we also want to draw attention to the works with optimistic viewpoints of the problems of earthquake forecasting /17-21/.

Fortunately, during the last years there was traced the serious "impulse" in the problem of earthquake forecasting, and these new researches allow to better understand the physical origin of earthquake harbingers and the reasons of failures of their forecasting.

1.1. Registration of different harbingers in big distances from epicenters

Now there is known more than 300 harbingers of earthquakes of different character and origin.

During the last years a number of scientists published the results of researches, indicative of possibility of registration of harbingers of strong earthquakes in the distance of more than 5000 km, and in some cases more than 10 000 km /1-4, 6-7,11, 21-24/.

1.2. Seismic-gravitational harbingers

Thus, as a result of researches carried out by the Physics of the Earth Department of Petersburg State University, the seismic-gravimetric complex in Petersburg registered the long-term tensile deformation (vertically) with duration of 12 days and nights, which forestalled the cycle of strong earthquakes of December 2004, including the strongest earthquake on the north of Sumatra island on 26.12.2004 which caused the catastrophic tsunami. Before each strong earthquake there were registered the deformations of less continuation (1-2 days and nights), which were observed earlier too. There was also noted the increasing of intensity of seismic-gravitational fluctuations, which accompany these deformations, the beginning of which always advanced the moment of breaks of strong earthquakes for 1-4 days and nights. At that, the first estimates of speed and length of waves. Low-speed waves (speed from 0.35 to 0.68 km/sec) of seismic origin have waves from 1520 to 7310 km. As a result of analysis of the received data the scientists came to the conclusion that the observed fluctuations

are connected with the deformational processes, which are taking place inside the continent with the complex block-hierarchical structure /3/.

1.3. Tideless variations of gravity

So, since 2002 the Scientific-Research Institute of forecasting and studying of earthquakes (Baku) has been carrying out the continuous measurement of tideless variations of gravity in the station "Binagadi", which is located in Absheron peninsula some 24 km from Baku. The measurements were carried out simultaneously by four high-precision quartz gravimeters of KB an KC types /21/.

As a result of measurements and interpretation of the received data, there were found out the gravitational signals in variations of gravity, which preceded the strong earthquakes, the epicenters of which are in big distances (in the radius of two thousand to tens of thousands km) from the registered stations. In the process of interpretations of results of researches there were deducted the gravitational effects from lunar and solar tides. As it is known, the solar tides cause the variations of gravity which do not exceed 0,1 mGal, and the amplitude of lunar variations is about 0,2 mGal.

Changes of tideless variations of gravity were registered before strong earthquakes in Indonesia, Pakistan, Japan, Taiwan, India, the Philippines, Iran. Statistic data show that the gravitational signals were registered more than in 85% cases, on the average, 8-15 days before strong earthquakes /21/.

1.4. Geochemical harbingers

In series of works (A.A. Hasanov, R.A. Keramova, 2006) there was noted the change of geochemical composition of fluids on the registering stations of the Republican Centre of Seismologic Service of Azerbaijan, before catastrophic earthquakes (M_{LH} = 8.9) in Indonesia on 26.12.2004 in the distance of about 6000 km from the epicenter of the earthquake /1/. In the works of A.A.Gasanov and R.A.Keramova are considered the facts of change of hydro-geo-chemical mode in the registering points of Azerbaijan before strong ($M_{LH} \geq 6.0$), deep-focus ($h \geq 100$ km) earthquakes, the sources of which are within Hindu Kush seismic zone of Alpine-Himalayan tectonic belt of the Earth, in spite of the fact of remoteness of these sources from the objects of observations ($\Delta = 2000 \div 5000$ km) /1,11/.

1.5. Seismic-hydro-geological harbingers

Studying of seismic-hydro-geological harbingers of earthquakes allowed to determine the presence of connection of changes of the level of ground waters in the region of Kamchatka peninsula with strong earthquakes, more than 8000 km distanced from the measurements point /3/.

1.6. Seismic harbingers

In a series of works /4.6/ it was determined that before strong earthquakes, on seismic stations situated in the distance of more than 3000 km from the epicenters, there was displayed the synchronization of micro-seismic noise.

The authors of researches (G.A.Sobolev and others, 2007; Lyubushkin, 2008) offer to use this effect as a harbinger during forecasting the strong earthquakes. It was determined that in big remoteness from epicenters of strong earthquakes the seismic stations registered the synchronic fluctuations of micro-seismic noise with the periods of 1-3 hours a few days before the tremor.

1.7. Low-frequency three-dimensional variations of gravitational field

During the last years there were started the researches of earthquake harbingers, which were based on discovery in 2003 of the earlier unknown effect of low-frequency three-dimensional changes of gravitational field before strong earthquakes in big distances from their sources, at times exceeding 10 000 km (E.N.Khalilov, 2003) /7, 22, 24/.

These signals are registered with the help of unusual physical instrument – "Torsion three-component detector of low-frequency gravitational variations" which was called by the author as station ATROPATENA. The station ATROPATENA uses the physical principle never applied before. The method of measuring and the instrument itself are patented in PCT, Geneva (E.N.Khalilov, Method for recording the low-frequency gravity waves and device for the measurement thereof. Patent of PCT. WO 2005/003818 A1., Geneva, 13.01.2005) /23/.

The station ATROPATENA uninterruptedly registers in three mutually-perpendicular directions the influence of changes of gravitational fields of geological origin on interaction of masses in "Cavendish balance" and on tideless variations of gravity. So, simultaneously was received the answer to one of the most actual questions of fundamental physics about reasons of variations of

"gravitational constant", registered by different scientists at different times in many countries of the world.

From 2007 there were officially given many forecasts of strong earthquakes for Special Region of Indonesia – Yogyakarta and to Pakistan Academy of Science, and to the Center of Studying the Earthquakes of Pakistan, with which the Scientific Research Institute at Institute of Earthquakes has bilateral memoranda about cooperation.

1.8. Classification of the considered "long-range" harbingers

So, the performed brief review allowed to mark out a few harbingers of earthquakes, which appear in big distances between registering points and epicenters of earthquakes:

- Seismic-gravitational anomalies /2/;
- Tideless variations of gravity /21/;
- Changes of hydro-geo-chemical mode /1,11/;
- Changes of the level of ground waters /3/;
- Synchronization of micro-seismic noise /4, 6/.
- Long-period three-dimensional variations of gravitational field /7/.

We didn't review some other harbingers, which also display in big remoteness from epicenters of strong earthquakes (variations of different parameters of ionosphere, electromagnetic noise disturbances, electric, magnetic and other harbingers).

1.9. What and how did the seismologists forecast heretofore?

Philosophy of short-term forecasting of earthquakes hasn't undergone essential changes during the whole history of its presence. The basis of all technologies of short-term forecasting of the earthquakes is to create the network of stations, which register the changes of geophysical, geochemical, hydro-geological and other parameters of geological medium before strong earthquakes near potential sources of possible earthquakes. It is considered that the more the stations there are and the closer they are to the potential earthquake source, the higher the probability of successful forecasting is.

Meanwhile, in practice it was much more complicated. In spite of the increasing of the number of stations in immediate vicinity of potential sources, the probability of authenticity of short-term forecasts hasn't gone over the level of 70-75%.

As it was shown in the brief review, before strong earthquakes there take place the changes of geological medium in big distances from the sources of future earthquakes. What is the physical mechanism of these changes?

In the works /7/ the authors come to conclusion that the main reason of long-period three-dimensional variations of gravitational field are tectonic waves, which are generated by the earthquakes source in the process of its preparation.

1.10. About possible influence of tectonic waves on different properties of geological medium

1.10.1.General information

Bases of the concept of tectonic waves were laid in the mathematical model of V.Elsasser in accordance with which the redistribution of compressive forces, averaged on cross-section of elastic lithosphere, are compensated with the tangential forces, which arise under horizontal shift of lithosphere along the viscous asthenosphere (Elsasser W., 1969). Afterwards, this model was used for quantitative assessment of aftershock activity transfer (Kasahara K., 1985; Baranov B.V., 1980).

Afterwards, the model of Elsasser was supplemented by J. Rice with the effect of viscous-elastic reaction of asthenosphere on horizontal shifts of lithosphere. He also took into account the real two-dimensionality of the process (Rice J.R., 1982). Theoretical analysis of propagation of waves of seismic activity in lithosphere was given in the works of F.Lehner and other researchers (Lehner F.K., Li V.C., Rice J.R., 1981). The effect of bend of lithosphere on liquid lithospheric base found its reflection in the works of Nadai A. and Artushkov E.V. (Nadai A., 1969; Artushkov E.V., 1979). Afterwards, in the works of Nikolayevskiy N.V., Karakin A.V. and Lobkovskiy L.I. was made an attempt to develop the two-dimensional theory of waves of bend – compression of lithosphere on viscous asthenosphere (Karakin A.V., Lobkovskiy L.I., 1984).

V.V.Rujich put forward hypothesis according to which (Institute of the Earth's crust, Irkutsk, oral report, 1998), each earthquake is accompanied with generation of condensational waves with extremely low velocity of propagation ($V < 0.1$ m/sec). V.V.Rujich gave them the name – slow deformation waves (SDW). This hypothesis well corresponds to the contrast deformation anomaly, fixed by Stepanov I.I. on 27 June 1998, 26 days after Shipun earthquake of 1 June (which consisted of 3 contrast single impulses with amplitudes of 92, 140 and 43 conventional units and intervals between them of about 7 hours). It allows to assess the speed of velocity propagation of SDW about 0.05 m/sec. In the high

background of cubic strains in the day of perceptible earthquakes, 1,5 - 24 hours before the event there are observed the unit impulse signals, which 2-3 and more times exceed the noise. For example, on 1 June 1988 there were registered 2 such signals with amplitudes of 38 conventional units for a day and night and 41 conventional units 1,5 hours before the event. And on 27.08.2000 before weaker event there were also noted 2 impulse signals: 68 conventional units 6,5 hours and 40 units 3,5 hours before the earthquake at the background of about 20 units. It allows to suppose that such kind of impulse signals in the high background can act the role of short-term harbingers before strong seismic events.

More extensive analysis of researches devoted to tectonic waves with a lot of references to original sources has been cited in the works /7,24/.

What way can the tectonic waves influence on changes of different parameters of natural environment?

1.10.2. Gravitational harbingers of earthquakes.

In Fig.1.1. is schematically shown the model of tectonic wave generation by the earthquake source and their successive passage under the stations ATROPATENA–AZ (Azerbaijan) and ATROPATENA-PK (Pakistan).

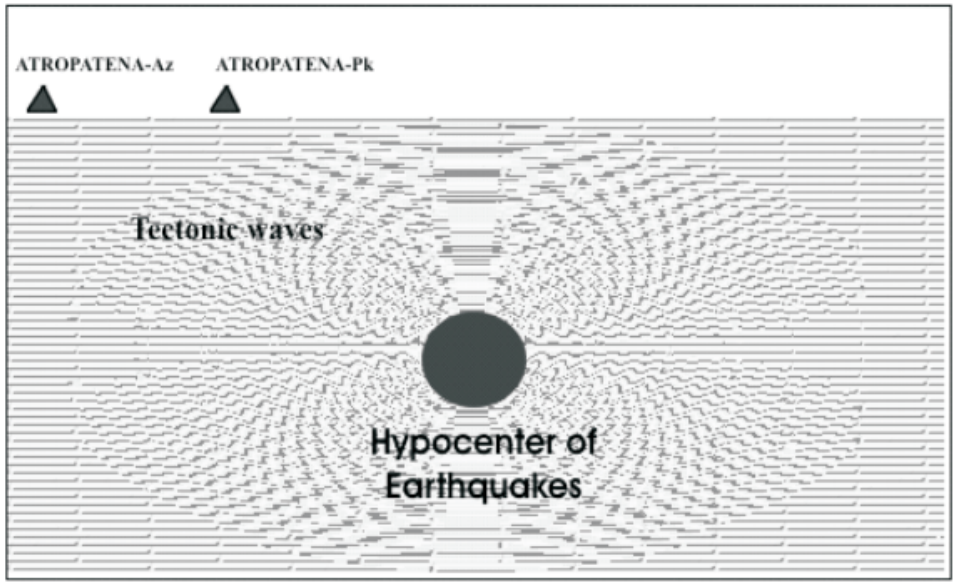


Fig.1.1. Schematic model of tectonic wave generation by the earthquake source.

In accordance with many researches and the rated models of different authors, the tectonic wave, similarly to the seismic one, has condensational and transverse components. In Fig.1 is shown the model of possible mechanism of tectonic wave propagation by the earthquake source, which is not spherical one.

The condensational tectonic wave propagation causes the alternate changes of rock density in a big stratum of lithosphere, along the direction of wave movement, Fig.2. Successive compression and expansion of lithosphere in the field of the passing of condensational wave causes the alternating increasing and decreasing of the rock masses under the registering stations. Therefore, the stations ATROPATENA register the alternate changes of gravity acceleration, as it is shown in the model, Fig. 1.2.

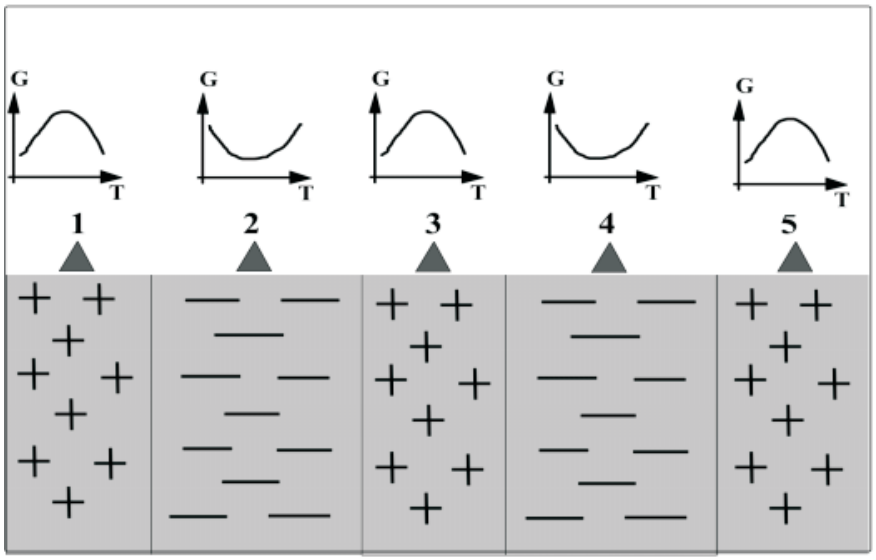


Fig.1.2. Model of influence of condensational tectonic wave on alternate changes of rock density and the corresponding variations of gravity.
1-5 - the registering stations ATROPATENA.

Movement of transverse tectonic wave causes the alternate changes of the density of rocks in a big stratum of lithosphere, perpendicularly to the direction of wave propagation, Fig.3. The successive alternate compression and expansion of lithosphere in the field of passing of the transverse wave causes the alternating increase and decrease of the mass of rocks from different sides of the registering stations. Therefore, the stations ATROPATENA register the alternate changes of the gravitational field in two mutually perpendicular horizontal directions, as it is shown in the model, Fig.1.3.

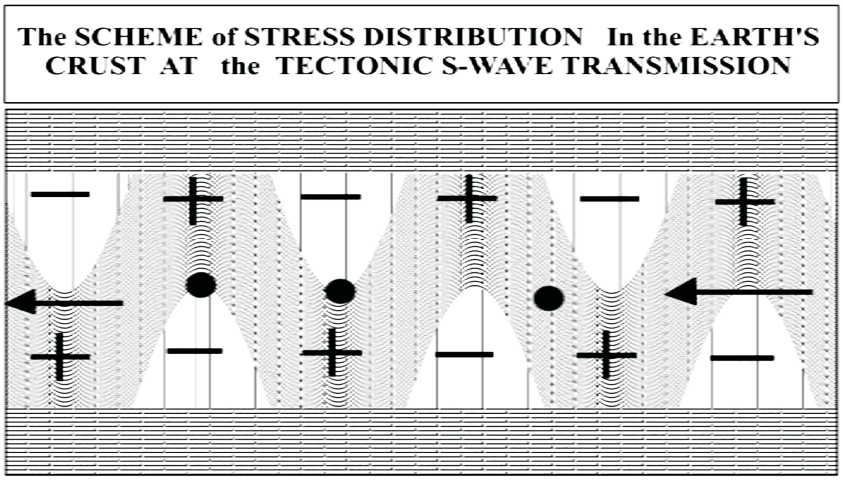


Fig.1.3. Model of influence of the transverse tectonic wave on variations of changing of the density of rocks in horizontal direction.

In Fig.1.4. as an example there is shown the gravitogram which was recorded by the station of earthquake forecasting ATROPATENA-AZ before strong earthquakes in the province of Sichuan (China) in May 2008.

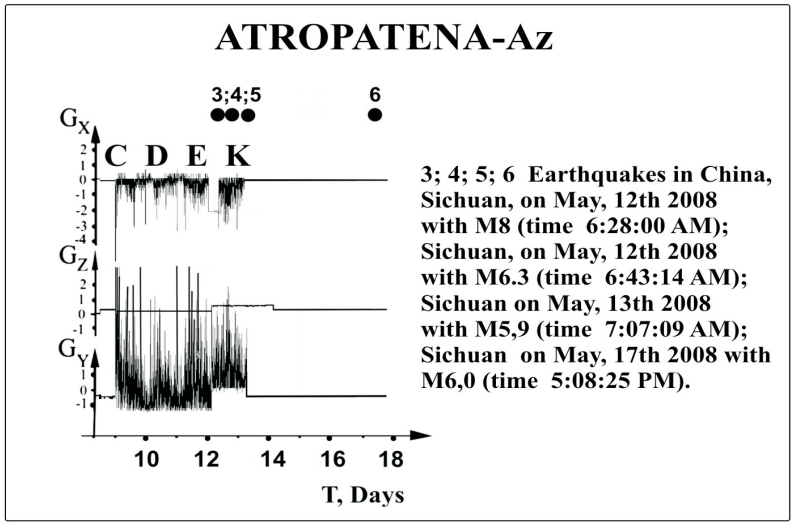


Fig.1.4. The registered anomalies of the gravitational field by the station ATROPATENA-AZ (Baku) before strong earthquakes in the province of Sichuan, China in May 2008.

Thereby, the physical mechanism of influence of tectonic waves on gravitational field of the Earth, to our opinion, is logically convincingly substantiated. This mechanism can explain all existing harbingers of earthquakes of gravitational character: long-period three-dimensional variations of gravitational field, tideless variations of gravity, seismic-gravitational effects, variations of gravitational gradient, etc.

Meanwhile, there is also the logical explanation of the mechanism of influence of tectonic waves on geochemical characteristics of geological medium, including hydro-geochemical, gas-geo-chemical ones and others.

1.10.3. Geo-chemical harbingers of earthquakes

In the work of I.I. Stepanov (I.I.Stepanov, 2002) were given very important, to our opinion, results of researches on monitoring volume deformations with the help of geochemical deformometer in the region of Avachin bay /5/. The concept, taken as a principle of deformometer, is based on the discovery of I.I.Stepanov of the special condition of atoms of some chemically inert elements, which are able to be in the volume of crystal lattices of minerals, similar in some relations with the ideal gas, and therefore, called "quasi-gaseous" one. According to the opinion of I.I.Stepanov, such substances are able to play the role of sensitive indicator of quantity of deformations of crystal lattices of minerals. During decreasing of the volume of lattices, the partial pressure of this "quasi-gas" inside is increased. So far as this process in first approximation can be considered as adiabatic, a part of atoms gains additional energy and gets the possibility to overcome the potential barrier which exists on the borders of partition: lattice - open environment. If the system "mineral – the surrounding atmosphere" is the closed loop, then the equilibrium position inside it will vary to increasing of concentration of steams of this substance in the gas over the mineral. This state is reversible, and during increasing of the volume of crystal lattice of the mineral, the atoms "extruded" from it come back to the mineral. So, uninterruptedly measuring the content of atoms of this element in the gas over the mineral, one may judge the degree of mineral deformation. At sufficiently low detection limit of measuring device, registration of small deformations, about 10^{-6} or less, becomes possible.

Thereby, the method of measuring the volume deformations of geological medium with the help of geochemical deformometer applied by I.I.Stepanov /5/ uses the principle which can be also displayed in natural geological medium during passing of the tectonic waves.

As it is known, the rocks and minerals have the structural anisotropy, and consequently, they are differently compressed, depending on the direction of compression. Under this feature, there is observed the peculiar selectivity of geochemical indicators of the medium (liquid or gaseous), depending on the direction, under which the tectonic wave passes through the rocks.

Similarly there can occur the changing of concentration radon on the zones of deep breaks under the influence of the passing tectonic wave.

1.10.4. Hydro-geological harbingers of earthquakes

Changes of the level of under waters during passing of tectonic wave may also logically be explained by the process of extrusion of water at compression of pores of rocks (increasing of level of groundwater) and draw of water into the pores at increasing of their volume under influence of tensile strains (decreasing of level of groundwater).

1.10.5. Seismic and acoustic harbingers of earthquakes

As it is known, the seismic characteristics of medium directly depend on its density, particularly, velocity of seismic wave propagation, the refraction index and absorption coefficient, spectral characteristic, etc.

Thereby, the alternate change of density of big rock mass under the influence of the passing tectonic wave leads to periodic changes of its seismic properties that cause the modulation of micro-seismic noise and the so-called "synchronization of micro-seismic noise" by the tectonic wave.

Anisotropy of rocks putting down the layers of lithosphere leads to the fact that the tectonic waves which pass at different angles to seismic stations, differently synchronize (modulate) the micro-seismic noise. It means that there is the selectivity on the direction (asymmetry of directional diagram) of kinematic and dynamic parameters of micro-seismic noise, modulated under the influence of tectonic waves /25/.

Similarly is substantiated the display of acoustic, particularly, ultrasound and infrasound harbingers of earthquakes.

1.10.6. Electric, magnetic, electromagnetic, optical and other harbingers of earthquakes

Alternate changes of stress condition of geological medium under influence of tectonic wave should bring to display other known harbingers of earthquakes too. As it is known, the change of level of underwater and density of rocks leads to change of electric properties of rocks that displays as electric harbingers of earthquakes (changes of electrical resistance of rocks).

On the other hand, change of density of rocks leads to change of their magnetic properties (changes of density and other characteristics of magnetic field).

Besides, under the influence of alternate deformations, quartz-containing rocks (piezocrystals) can display the piezoelectric effect and, as a consequence, bring about the appearance of static electricity in huge stratum. It, in its turn, can influence on ionization of lower layer of atmosphere above the projection of the front of tectonic wave on the surface of the Earth.

1.10.7. Main reasons of inefficiency of classical methods of earthquake forecasting

The results of our researches and discussions have shown that the display of earthquake harbingers has a considerably more complicated nature, than the seismologists have thought till now /7/.

Thereby, we can suppose that there are two types of earthquake harbingers:

- Local harbingers of earthquakes;
- Long-range harbingers of earthquakes;

The biggest problem is that the main cause of both types of earthquake harbingers are the same mechanisms – changes of stress condition of rocks.

1.11. Local harbingers of earthquakes

Local harbingers of earthquakes are directly connected with the processes of critical increasing of stress conditions of rocks in focal zone. As a result of it, are displayed the processes of compression, extension, displacement, bend, etc. of big strata of the Earth in different areas of focal zone. It is practically impossible to model this process because of its nonlinearity /Dr. Robert J. Geller, 1997/. Therefore, the same source of the earthquake can have different (dissimilar) displays of harbingers during the repeated earthquakes. Majority of local harbingers of earthquake unstably display near the earthquake epicenter (gravitational, seismic, geo-chemical, electrical, magnetic, electromagnetic, deformational ones, etc.).

1.12. Long-range harbingers of earthquake

Long-range harbingers of earthquakes are secondary ones and reflect the display of change of different parameters of geological medium (gravitational, seismic, geo-chemical, electrical, magnetic, electromagnetic, deformational ones, etc.) under influence of tectonic waves, generated by source of the preparing earthquakes. Physical mechanism of display of these harbingers is described above.

1.13. Fundamental mistake of seismology at short-term forecasting of earthquakes

From the above-mentioned arguments it is clear that in short-term forecasting of earthquakes the local and long-range harbingers of earthquakes are simultaneously registered. Therefore, frequently, as a principle of local short-term forecasting of earthquakes (in the radius of several hundreds kilometers from the epicenter of the earthquake) were taken the long-range harbingers from the earthquake sources, which are in big distances from the registering points (up to 10 000 kilometers).

As the local harbingers obey the model of Doctor Robert Geller, their display is hardly forecasted.

Meanwhile, the long-range harbingers of earthquakes, which are the result of generation of tectonic waves by the sources of strong earthquakes, are stable and of high-quality. As the experience of using the station ATROPATENA during two years shows, the long-range gravitational harbingers of earthquakes allow to forecast with 90% accuracy, and this probability will be increased as the new stations ATROPATENA are included into the Global Network of Forecasting the Earthquakes.

1.14. What to do?

For almost 100 years of history of forecasting the earthquakes the seismology has not only stored the extensive information about different harbingers of earthquakes, but also created the unique local networks of points of monitoring of different parameters of geological medium around focal zones of strong earthquakes and deep breaks. In different countries were created the multiple seismological polygons for monitoring of geological medium.

To our opinion, the only way out of the arisen situation is the creation of the Global Network of Forecasting the Earthquakes, consisted of the stations of forecasting the earthquakes united into the single network, registering the most

stable and high-quality long-range harbingers of earthquakes. The global network must be connected with multiple local networks. Thereby, the Global Network of Forecasting the Earthquakes will allow to register the long-range harbingers of earthquakes, and the local networks will simultaneously register the local harbingers. Interconnecting of long-range and local harbingers will allow to increase the accuracy of short-term forecasting of the earthquakes.

I would like to inform that the analog of similar network has already begun to be created on the basis of the stations ATROPATENA with points in Baku (Azerbaijan), Islamabad (Pakistan) and Yogyakarta (Indonesia).

References

1. A.A.Hasanov, R.A. Keramova. Reflection of global geodynamical processes in seismic-geo-chemical mode of fluids of Azerbaijan by the example of catastrophic earthquake in the Indian ocean (26.12.04; M_{LH} =8.9). In the book Geophysics of XXI century: 2005, M. collected papers of GEON. "Scientific world". 2006. pp. 326-330.

2. L.N. Petrova, E.G. Orlov, V.V.Karpinskiy. Large-scale deformations of the Earth before strong earthquakes on the observations with the help of seismic-gravimeters. Physical bases of forecasting the rock failure. Thesis of reports of VII International school-seminar. Geophysical observatory "Borok", 17-21 October 2005. M., 2005, p. 46.

3. G.N. Kopilova, T.K.Pinegina, N.N. Smolina, Seismic-hydro-geological effects of the strongest earthquakes (at the example of Kamchatka region). Pp. 166-173. Collected materials of scientific meeting "Problems of modern seismic geology and geodynamics of Central and Eastern Asia (2 volumes). 18-24 September 2007 IZK SO RAS Irkutsk.

4. A.A. Lyubushin. Micro-seismic noise in minute diapason of periods: properties and possible forecasting features. Physics of the Earth. #4, April of 2008, pp. 17-34.

5. I.I.Stepanov. Monitoring of cubic strains with the help of geochemical deformometer in the region of Avachin bay. In the collection of Modern volcanism and the processes connected with it. Materials of the anniversary session of Kamchatka scientific center of DVO RAS, devoted to 40 –year of Institute of volcanology, 8-11 October 2002.

6. G.A. Sobolev, A.A.Lyubushin, N.A.Zakrjevskaya. Asymmetric impulses, periodicity and synchronization of low-frequency microseisms. Volcanology and seismology. #2, March, April of 2008, pp. 135-152.

7. V.Y.Khain, E.N.Khalilov. Space-time regularities of seismic and volcanic activities. Bulgaria, Burgas, SWB, 2008, p. 304.

8. Aki K., Earthquake, prediction, societal implications, Univ. Southern California, From Reviews of Geophysics.

http://www.agu.org/revgeophys/aki00/aki00.html

9. Dr. Robert Geller. Nature, vol. 385, pg 19-20, 1997

10. Robert J.Geller, D.D. Jackson, Y.Y.Kagan, F.Mulargia, Earthquakes cannot be predicted, From Science.
http://scec.ess.ucla.edu/%7Eykagan/perspective.html.

11. A.G. Gasanov, R.A.Keramova – Hydro-geo-chemical criteria of Caspian earthquake (25.11.2000) in ground waters of north-east and north-west of Azerbaijan. International Conference for Natural Hazards: mitigation and management. March 12-15, 2001, India, Amritsar.

12. Ian Main, Is the reliable prediction of individual earthquakes a realistic scientific goal?, Debate in Nature, 1999
http://www.nature.com/nature/debates/earthquake/equake_contents.html

13. Ian Main. Earthquake prediction: concluding remarks. Nature debates, Week 7, (1999).

14. Ludwin R.S., 2001, Earthquake Prediction, Washington Geology, Vol.28, No. 3, May 2001, p.27.

15. Predicting and earthquake.
http://earthquake.usgs.gov/hazards/prediction.html

16. Robert J.Geller, D.D.Jackson, Kagan Y.Y., Mulargia F., Earthquakes cannot be predicted, From Science.
http://scec.ess.ucla.edu/%7Eykagan/perspective.html

17. Max Wyss, Not yet, but eventually, Nature debates, Week 1, (1999).

18. Thanassoulas, C., and Klentos, V., (2001). Very short-term (+/- 1 day, +/- 1 hour) time prediction of a large imminent earthquake. The "second paper"., Institute of Geology and Mineral Exploration (IGME), Athens, Greece, Open File Report A. 4382, pp.1-24.

19. Mavrodiyev Cht., The electromagnetic fields under, on and over Earth surface as "when, where and how" earthquake precursor, European Geophysical Society, Geophysical Research Abstracts, Vol. 5, 04049, 2003.

20. Mavrodiyev S. Cht. Applied Ecology of the Black Sea, ISBN 1-56072-613-X, 207 Pages, Nova Science Publishers, Inc., Commack, New York 11725, 1998.

21. Khain V.Y., Khalilov E.N. Tideless variations of gravity before strong distant earthquakes. Science Without Borders. Volume 2. 2006/2006. ICSD/IAS H&E, Innsbruck, 2006, pp. 319-339.

22. Khalilov E.N. About possibility of creation of international global system of forecasting the earthquakes "ATROPATENA" (Baku-Yogyakarta-Islamabad). Natural cataclysms and global problems of the modern civilization. Special edition of Transaction of the International Academy of Science. H&E. ICSD/IAS H&E, Innsbruck, 2007, pp.51-69.

23. Khalilov E.N. Method for recording the low-frequency gravity waves and device for the measurement thereof. Patent of PCT. WO 2005/003818 A1., Geneva, 13.01.2005).

CHAPTER 2

STATION OF FORECASTING OF EARTHQUAKES "ATROPATENA": PHYSICAL PRINCIPLE AND THE FIRST RESULTS

Introduction

As the accuracy of measuring the values of gravitational constant G rises, the differences between the results of G measurements made by different scientists are strangely increased.

For the first time P.Dirac told about the possibility of changes of gravitational constant (1). Afterwards, a great number of scientific researches of different scientists were devoted to this problem.

P.Dikke showed the theoretical possibility of decreasing of G with increasing of the age of the Universe (2). According to the opinion of K.Stanukovich, G is increased with the age of the Universe (3).

The authors (4) have received the variations of the measured values G, which considerably increase the error of the measuring instrument.

Meanwhile, summing up their researches, the above-mentioned scientists came to the following conclusion: "The analysis of variations of the results of measurements of the gravitational constant shows that the changes of geomagnetic field, the instability of temperature and atmosphere pressure, the residual gas flows in the vacuum camera, the changes of plant tilt cannot lead to the observable effects. Variations of gravitational field connected with the changes of relative position of the Earth, the Moon and the Sun are too small for direct sensible influence on the results of measurements."

The results of researches of G variations were published in World Data Center (most quickly it is possible to get access to that data via:

http://zeus.wdcb.ru/wdcb/sep/GravConst/welcome.html). In work (5) it is shown, that variations of the gravitational constant have the certain cyclicity. In the work (6) it is spoken about possible influence of super-long gravitational waves on indications of Cavendish balance. Morganstern R. made the assumption about existence of cosmological limit in the possible variations of G (7).

To this day two most accurate measurements of G have been obtained by groups of scientists in Washington University in Seattle and International Bureau of Weights and Measures of Paris, and in both cases the accuracy of the experiment was 1/10000, however, the difference of the received values is considerably more than the probable errors. In Seattle there have been received the value (8):

$$G = (6.674215 \pm 0.000092) \cdot 10^{-11}\ m^3 \cdot kg^{-1} \cdot s^{-2}.$$

Jean-Paul Mbelek and Marc Lachieze-Ray from French commission on atomic energy declared that they had succeeded in understanding the reason of similar discrepancy between experimental values. The researchers supposed that at the heart of the observed discrepancies is the interference of gravitational and electromagnetic fields.

In their works they produced the calculations of the expected values of gravitational constant in different regions of the planet. The calculations were based on the theories supposing the availability of latent dimensions in space, particularly, theory of strings, in the frameworks of which the electromagnetic and gravitational fields are combined (9).

In the calculations it turns out that terrestrial gravity will be stronger in the places where the magnetic field is stronger, that is, for example, the maximum values can be expected in the regions of north and south magnetic poles. According to their opinion, the available experimental data fully agree with the theory, however it is required to carry out precision measurements both in the regions of the poles themselves and in equatorial regions.

Meanwhile, some scientists do not share this concept (10).

In the work (11) it is noted that during last years the spread of measured values of gravitational constant has reached 0,7%. The new experiment of the group of Swiss physics from Zurich University allowed to obtain some result which is different from that of the French. Thus, in a special cemented cellar near Willigen (Switzerland), they measured by means of sensitive laboratory balance, the differences in the mass of two small weights, under or above which were placed two big containers of mercury with the weigh of 13 tones. Measuring the

changes of weights of trial masses by ultra-sensitive balance, the researchers calculated the value of gravitational constant, which equals to:

$$G = (6{,}6754 \pm 0{,}0005) \cdot 10^{-11}\ m^3 \cdot kg^{-1} \cdot s^{-2}$$

Their data are different from the results received by the group in Seattle and by French scientists.

In any case, the attempts to specify the measured values of G so far has led to strengthening of deflections in the data, received by different scientists of the world. It accentuates some confusion of the scientists, as the variations of G do not agree with the basic regulations of general relativity.

It could be possible to speak about the mistakes, connected with the error of measurements or unaccounted disturbances, if they were single instances. Meanwhile, the changes in time and space in the measured values of G are observed by many scientists during last ten years, increasing proportionally to rising the accuracy of measuring systems.

Modern ideas of gravity were for the first time described by A.Einstein within the general relativity (17). In accordance with general relativity, the coefficient G is the constant.

2.1. Methodology

For experimental studying of the space-time variations of measured values of G there was created a new instrument, called by the authors as detector ATROPATENA. The construction ATROPATENA has the application for PCT patent (12).

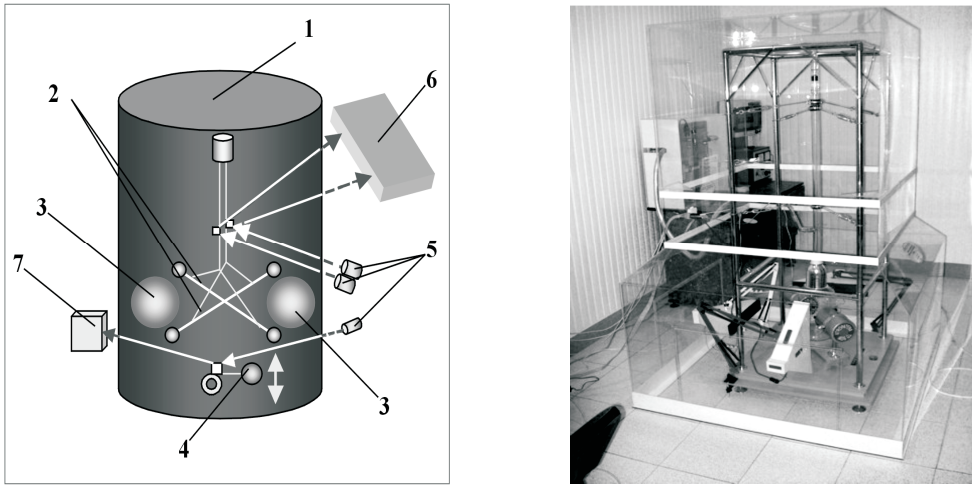
ATROPATENA is a closed and environment-isolated system of sensors, using the physical principle of Cavendish balance, where two balance-beams (instead of one) with small weights on the ends 2 are hung on the threads, and these balance-beams are situated mutually perpendicular. Between small weights, placed on the ends of two balance beams, equally spaced are placed the big weights 3, Fig.1 (a).

Besides, there is the third measuring sensor – the trial mass 4, hung on a special elastic lever and the available possibility of vertical displacements during changing the relative values of acceleration of gravity Δg. Variations of Δg are caused by lunisolar floods and appearance of local gravitational anomalies, which can be caused by the changing of density of rock mass under the instrument as a result of the changing of their stress condition, and consequently their mass.

As seen in the scheme, on the balance-beams with the weights 2 and on the lever of vertical sensor 4 there are tiny mirrors on which three laser beams are

directed. Being reflected from the mirrors, the beams hit the sensitive optical matrix 6 and 7, where occurs the transformation of optical signal from laser mark into electric signals and their transmission into analog-to-digital converter. After that, the digital signal is transformed to special block of the computer with the following recording in special format. The software developed in Scientific-Research Institute of prognosis and studying the earthquakes (SRIPSE) allows to automatically record the information in the form of separate files for definite period of time, determined by the operator.

In Fig.2.1. (a) is schematically shown the instrument ATROPATENA.



(a) (b)

Fig.2.1. The scheme of the construction (a) and the photo (b) of detector ATROPATENA.

1 – glass body of the detector; 2 – balance-beams with small weights on the ends; 3 – big weights; 4 – trial weight, which is hung on elastic lever; 5 – laser emitters, 6 – sensitive optical matrix for horizontal sensors, 7 – sensitive optical matrix for vertical sensor.

All sensitive system is placed into the special glass body 1 isolated from the environment, where the deep vacuum has been created and is constantly supported (10^{-4} MPa).

In different places of the sensitive system some temperature sensors with 0,1C° accuracy have been installed which are connected to control block of temperature of system. In the room where ATROPATENA is located, is kept the permanent temperature with accuracy of ± 1° C.

For excluding the mechanical effects and better heat insulation, the vacuum body with sensitive system is placed into translucent plastic body, which allows to visually observe the work of system (Fig.2.1.b).

Together with the noted sensors, in ATROPATENA is also provided the digital seismic station using the three-component seismic receiver, the information of which is also transmitted to the computer and is uninterruptedly recorded in three channels X, Y, Z. The recording of seismogram in three channels is carried out uninterruptedly in digital form.

The registration of seismic fluctuations is necessary in order to exclude the possible influence of these fluctuations on destabilization of sensitive system of detector ATROPATENA and appearance of false anomalies, caused by seismic processes.

The remote controlling of the detector and remote pickup of information minimize the external influences on sensitive system.

All elements of sensitive system have been made of non-metallic materials, what excludes the influence of magnetic field and electromagnetic radiation on these elements. ATROPATENA is placed in the building of Scientific Research Institute of Prognosis and Studying of Earthquakes in Baku (Azerbaijan). Since 1 April 2007 the station has been completely put into operation, that allowed receiving the high-quality information about variations of gravitational field in time in three axes X, Y, Z, and the seismologic information simultaneously recorded by means of wide-band digital seismic station Tethys-SD. First, ATROPATENA was provided for experimental researches of possible influence of super-long gravitational waves on the indications of Cavendish balance.

If to proceed from classical ideas of fundamental physics, then the detector ATROPATENA, at first sight, is accepted as absolutely senseless instrument, as it is considered incontestable, that the gravitational constant is a fundamental constant and cannot be changed in time or in space. But the author didn't rule out the possibility of influence of super-long gravitational waves on Cavendish balance and wanted to check that idea (10).

Meanwhile, ATROPATENA registered numerous signals, which have definite regularities and high correlation with strong earthquakes in different regions of Eastern Hemisphere of the Earth.

In Fig.2.2. is shown the schematic sketch of actual orientation of Cavendish balance in the station ATROPATENA. The sketch represents the view from above, X and Y designate correspondingly oriented balance-beams with small weights on the ends, and m1 and m2 are big weights. S, N, W, E designate accordingly north, south, west, east.

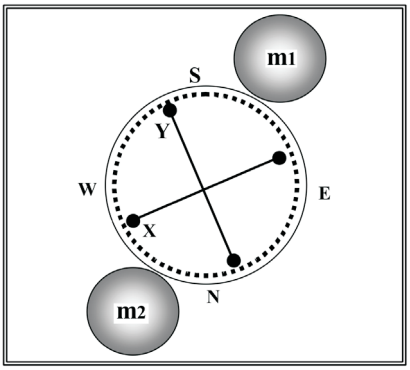


Fig. 2.2. Schematic sketch of actual orientation of Cavendish balance in the station ATROPATENA.

So as the further statement of the text to be convenient, we called the recordings of the detector ATROPATENA "the gravitograms", by analogy with seismograms. The detailed studying of gravitograms with anomalous deflections of measured values of G can explain subtler physical nuances of these processes.

We want to remind that on the gravitograms the graph G_X reflects the movement of the balance-beam X, and the graph G_Y reflects the movement of the balance-beam Y (Fig.2), the graph G_Z reflects the changes of gravity, that is for example the vertical movements of trial weight. And the increasing of values G_X and G_Y means approaching of small weights on the balance-beams by big weights, and decreasing – moving away from the big weights. On the coordinate axis are shown the conventional units, which reflect the deviation amplitude of small weights on the ends of balance-beams relative to big weights.

The registration of values of all three sensors is carried out with discontinuity in one second. Using of red lasers with the length of wave 645 nm and special optical matrixes for registration of laser mark and its displacements allowed registering the deviations of laser-beams on the angle to 0,1 degree. The whole process of registration takes place in digital form automatically, without participation of operator, and the received time series are archived by means of special program.

We also want to remind that these deviations correspond with variations of gravitational constant G in the third and fourth signs after comma.

2.2. Results

In Fig.2.3. are shown the gravitograms with two gravitational anomalies, registered on 5 January and 10 January 2008.

In all graphs of the axis, G_X and G_Y show the conventional units of amplitudes of variations in time of the indications of Cavendish balance, oriented, correspondingly, in parallel with axes X and Y. The axis G_Z shows the conventional units of the amplitudes of variations in time of gravity Δg.

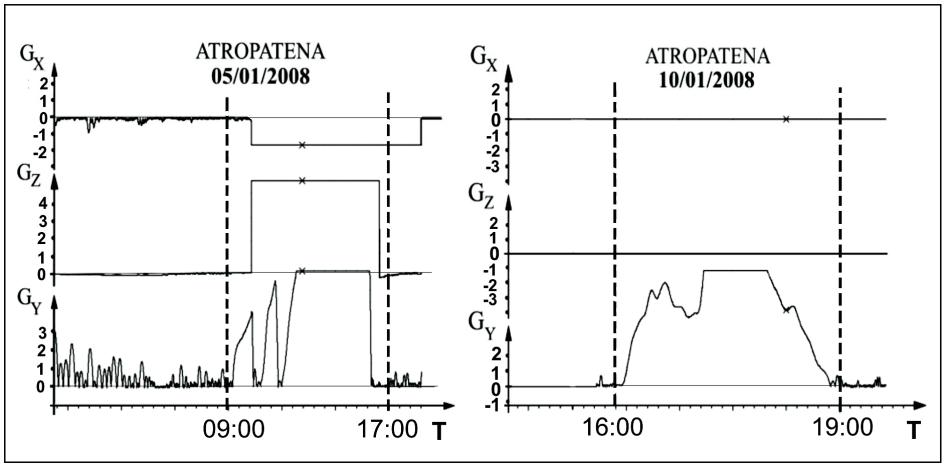


Fig.2.3. Gravitograms of 05 and 10 January 2008.

T – time.

As it is seen in the gravitogram of 5 January, whereas small weights of the balance-beam X are moving off from the big weights (G_X is decreasing), the weights of the balance-beams and G_Y are approaching with noticeably more amplitude (G_Y is increasing). At the same time, G_Z also shows the increasing of gravity almost synchronically with G_Y. The fact of lateness of the beginning of changes G_Z and G_X relative to G_Y for 64 minutes is also notable. At the same time, G_Z comes back to its former position 30 minutes later than G_Y, whereas G_X does it 2,5 hours later than G_Y. We see that all three sensors show the strongly pronounced gravitational signal, which evidently has the same nature, but there exist great displacements in time of its registration. Period of the signal is also quite long and it is 8 hours. During these anomalies, the seismic station didn't register any seismic fluctuations, which exceed the background noises. Besides, seismic signals cannot have the period of several hours. Strong earthquake took place on 7 January in the region of Indonesia of M(magnitude)5,9 (coordinates are 0.795 S 134.012 E).

It is interesting to see the other example of registration of quite intensive variation in time of gravitational constant G with strict selectivity to the direction. This signal has been registered only by the sensor G_Y. Two other sensors, as it is seen in the gravitogram, "keep silent". The period of signal is three hours. During recording of signal, any seismic fluctuations weren't registered. Strong earthquake of M6,5 took place on 15 January in the region of Fuji islands (coordinates are 21.966 S 179.530W).

The authors took all data about earthquakes in this article from the catalogues of U.S. Geological Survey Earthquake Hazards Program – USGS (the quickest you can get the access to these catalogues on the site http://earthquake.usgs.gov/eqcenter/eqarchives/significant/).

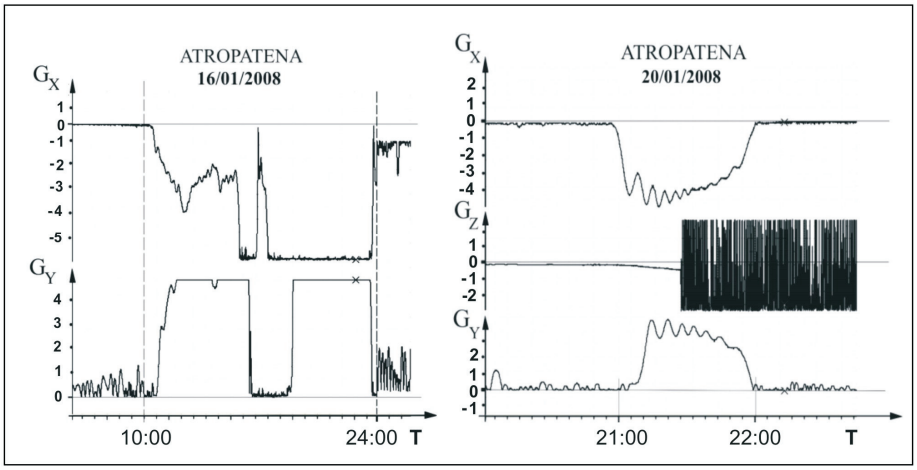


Fig. 2.4. Gravitograms of 16 and 20 January 2008.

T – time.

At first we'll consider the gravitogram of 16 January, Fig.2.4**.** Because of absence of signals G_Z this graph isn't demonstrated. Since 10:00 the decreasing of value G_X and increasing of G_Y have begun synchronically. As it is seen there is some difference in the form of graphs G_X and G_Y, but the whole tendency, which shows the high negative correlation, does not raise doubts. The graphs practically mirror each other. While the small weights of the balance-beam X move away from big weights, the weights on the ends of the balance-beam Y get closer, and the same takes place in reverse direction. The whole period of the observed signal is 14 hours. Quite interesting signal was also registered on 20 January, when the graphs G_X and G_Y during 2 hours registered the signal almost mirrored in both gravitograms. Meanwhile, approximately an hour later, after appearing of this

signal, G_Z begins to uninterruptedly register the high-frequency quasiharmonic signal with the period of 4-8 minutes. After the sensors G_X and G_Y stop registering the signals, G_Z continues registering the high-frequency signal right up to 23 January inclusive, and such duration of uninterrupted appearing of signal is quite unusual for the sensor G_Z. On 22 January strong earthquake takes place in Indonesia of M6,2 (coordinates are 1.011 N 97.438 E).

In the gravitograms of 02-03 February very interesting anomalies were registered, Fig.2.5. If G_Y registered three in series alternate long-period signals with periods accordingly 11; 8 and 7 hours, then G_X registered the mirror image of these signals, but the first (I) and second (II) of them are modulated by high-frequency constituent with the period of 4-9 minutes, and the modulatory high-frequency signal in both cases lasts about 5 hours.

On 04 –05 February on the gravitogram again appears the typical signal, reminding in character the signal of 02-03 February, but the gravitational signal G_X is modulated by high-frequency constituent with period of 4-9 minutes at the beginning (III) and at the end (IV) of the anomaly. The duration of the modulatory signal is approximately the same and it is about 2 hours. This fact is quite interesting, as the signal G_X is clearly limited at the beginning and at the end of the high-frequency constituent.

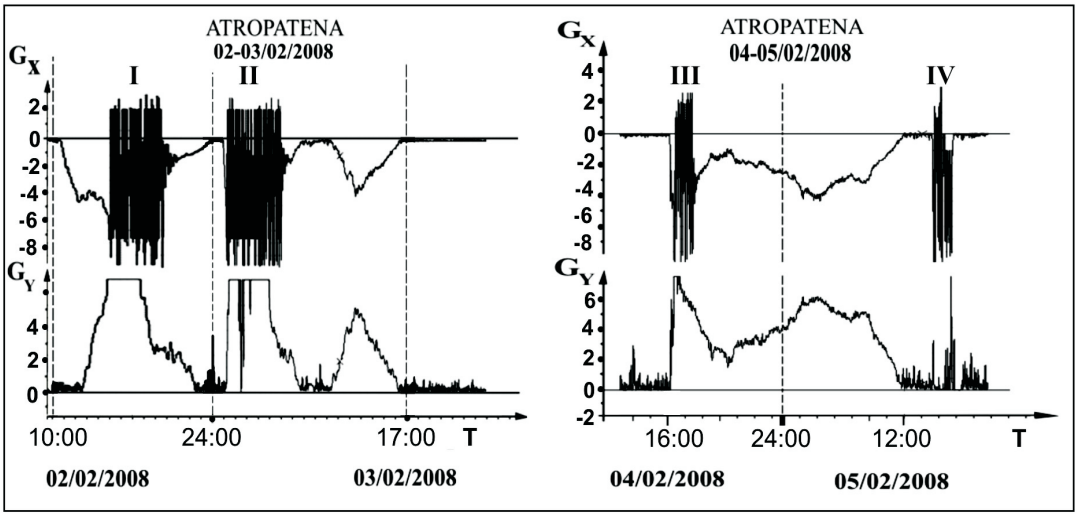


Fig.2.5. Gravitograms of 02-03 and 04-05 February 2008.

T – time.

The strong earthquake takes place on 8 February of M7.2 (coordinates are 10.725 N; 41.898 W) in the region of north middle-oceanic ridge in Central part of the Atlantic ocean, and on 10 February takes place the strong earthquake of M6,5 (coordinates are 60.757 S; 25.582 W) in the sphere of south Sandwich islands. To our opinion, it is possible that the anomalies, registered on 02-03 February, are connected with the earthquake of 8 February, and the anomalies of 04-05 February are connected with the earthquake of 10 February.

Two strong earthquakes took place on 07 May 2008 near the coast of Honshu in Japan: the first one - at 16:02:01 of M6.2 (coordinates are 36.21S 141.47E) and the second one – at 16:45:20 of M6.8 (coordinates are 36.14S 141.45E). The analysis of the recordings of ATROPATENA showed that on 2 May the sensor G_X began to register the intensive negative anomaly "A" (Fig.2.6) which lasted till 3 May 04:25. 2 hours later after this anomaly the sensor G_X registered the second negative anomaly "B", which lasted till 5 May. It is notable that these anomalies are the high-frequency pulse bursts with the periods 3,5 – 6,5 minutes. Two strong earthquakes took place in Japan on 7 May 2008 with a small difference in time. So, the earthquakes took place 5 days after the beginning of recording the anomaly and two days after the anomaly has stopped.

The catastrophic earthquake took place on 12 May 2008 in China in the region of Sichuan at 06:28:00 of M8 (coordinates are 31.08S 103.27E) and the second earthquake took place at 06:43:14 of M6,3 (coordinates are 31.25S 103.68E), as a result of which, according to provisional data, about 70 thousand people died, and the death-roll is being specified now.

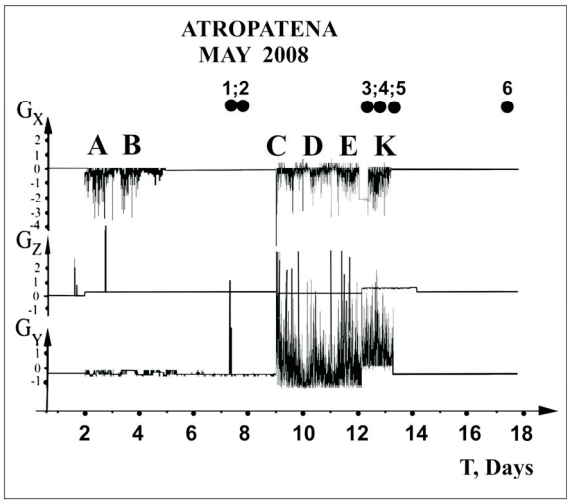


Fig. 2.6. Gravitogram of 1-17 May 2008.

A,B,C,D,E,K – the registered anomalies of gravitational field;
1;2 – the earthquakes in Japan near the coast of Honshu on 7 May 2008 of M6.2 (time – 16:02:01) and of M6.8 (time – 16:45:20);
3;4;5;6 – the earthquakes in China, Sichuan on 12 May 2008 of M8 (time – 06:28:00); of M6.3 (time – 06:43:14); Sichuan on 13 May 2008 of M5,9 (time – 07:07:09); Sichuan on 17 May 2008 of M6,0 (time – 17:08:25).

On 9 May two sensors G_X and G_Y at once began to register the strong anomalies C, D, E, K of gravitational field (Fig. 6), and G_Y registered the intensive positive anomaly which consisted of high-frequency pulse burst with periods of 3,5-8 minutes, and G_X registered the negative one, which consisted of pulse bursts with analogous periods. The amplitude of anomalies of sensor G_Y more than three times increases the amplitude of anomalies of sensor G_X. The anomalies of G_Y during visual analysis consisted of four well-separable pulse bursts (anomalies) according to amplitude modulation – C, D, E, K. The anomaly K differs from the anomalies C, D, E, in several signs. Firstly, on G_X , after completion of anomaly E, is observed the decreasing of indications on two conventional units, which lasts during 15 hours without modulation, and after returning of indications to the background value there begins the recording of anomaly K. The anomaly K begins at 15:22 on 12 May and completes at 09:30 on 13 May. Secondly, on the G_Y the anomaly K also differs from previous anomalies. The anomaly K begins on 12 May and completes at 10:55 on 13 May, and the smallest extreme of values of the anomaly K is approximately two units higher than the smallest extreme of anomalies C, D, E. After completion of the anomaly K, the values of recording return to background level.

So, to our opinion, the anomalies C and D are the harbingers of the Chinese earthquakes 3 and 4 (Fig.2.6), E and K are the harbingers of the earthquakes 5 and 6.

Detector ATROPATENA has simultaneously registered G variations differed from each other, in two mutually perpendicular directions and the variations Δg before strong distanced earthquakes since April 2007 till now in 93% of cases.

In previous researches the author together with V.E.Khain by means of standard gravimeters discovered the changes of gravity before strong distanced earthquakes (13).

Starting from the regulations of general relativity, the gravitational interaction by its nature represents the changes of space crookedness, which causes by masses and is their integral property.

In Cavendish balance takes place the interaction of small weights on the ends of the balance-beam, hung on a thin thread with big weights, what causes the turning of balance-beams on their axis for some angle. The angle of turning of the balance-beam is compensated with the elastic force of torsion of the thread, on the value of which the gravitational constant is calculated. But if other big weights appear near scheme, then they introduce additional distortions into the crookedness of space, formed by big weights in Cavendish balance. So, we'll have the new system of interactive weights, where the changes of space crookedness will be the

resultant one of interaction of weights in Cavendish balance and additional weight. In this case, Cavendish balance will show another result.

In real conditions of the Earth there are many geological factors, which create quite intensive gravitational anomalies, changing in the space and in time and many times increasing the gravitational effects, caused by movement of planets of solar system, including the additive effect of lunisolar floods. These effects can be caused by convective flows in the mantle, movement lithospheric plates, tectonic waves, etc.

To our opinion, just in this way may be explained the fact that during last ten years, in spite of permanent increasing of the accuracy of instruments, registering the gravitational constant G right up to the sixth sign after comma, nevertheless, it is impossible to register G accurate within higher the third sign after comma, about which the yearly published data of CODATA witness.

According to our opinion, it isn't excluded that ATROPATENA registered the tectonic waves, which can be emitted by the centers of future earthquakes. Tectonic waves, in contrast to seismic ones, are very slow and long, and they are also called "the stress waves" (14). Tectonic waves, the same way as the seismic ones, are mechanical (15), and in solid medium they have longitudinal and transversal constituents. Passing through under the station, these waves compress and stretch the layers of the Earth of a big thickness and with it they change their density and, as a consequence, the mass. The changing of mass under the detector ATROPATENA is registered by three sensors – X,Y,Z, depending on the type of wave and its direction. Longitudinal and transverse tectonic waves in different way influence on Cavendish balance, depending on the orientation of balance with respect to the wave.

For more accurate determination of coordinates of future strong earthquake, it is necessary to use al least three stations ATROPATENA, spread on big distance from each other.

2.3. Conclusions

On basis of these researches the author came to several important conclusions:

1. Have been authentically registered the anomalous changes in time of the measured values of gravitational constant G, which differ from each other depending on orientation of Cavendish balance.

2. It has been determined that the variations of the measured values of G, registered by different scientists earlier, are connected, mainly, with influence of

external gravitational fields of geological origin on indications of Cavendish balance.

3. Has been created a new instrument – detector ATROPATENA, which allows uninterruptedly registering changes in time of variations of G in different directions together with the variations of acceleration of gravity Δg, that gives the opportunity of access to a new resource of physical information about geological and cosmic processes.

4. Detector ATROPATENA simultaneously has registered time variations of gravitational constant G, which are different in sign and amplitude, in two mutually perpendicular directions and variations of gravity Δg before strong distanced earthquakes in 93% of cases, what gives us grounds for creation a new technology of prognosis of the strong earthquakes in prospect.

References

1. Dirac. P.A.M. The cosmological constants. Nature, 139, 323 (1937).

2. Dicce R., Gravitation and relativity, Moscow, Mir, 251-294 (1965).

3. Stanukovich K.P., To a question on possible change of a gravitational constant. DAS USSR, Vol. 147, N 6, 1348-1351 (1962)

4. Izmailov V.P., Karagioz O.V., Parkhomov A.G., Researches of variations of results of measurements of the gravitational constant. Physical thought of Russia. N ½, 20-26 (1999).

5. Izmailov V.P., Karagioz O.V., Measurement of a gravitational constant of torsion balance. Measuring technics. Research of variations of results of measurements of a gravitational constant. Moscow, № 10, 3-9 (1996).

6. Khain V.Y., Khalilov E.N. Rhythms of natural cataclysms and super-long gravitational waves. Natural Cataclysms and global problems of the modern civilization. Special Edition of Transaction of the International Academy of Science. H&E. ICSD/IAS, Innsbruck, 105-118 (2007).

7. Morganstern R. Cosmological Upper Limit on Time Variation of G. "Nature", v.232, 109 (1971).

8. Jens H. Gundlach, Stephen M. Merkowitz. Measurement of Newton's Constant Using a Torsion Balance with Angular Acceleration Feedback Phys. Rev. Lett. 85, 2869 - 2872 (2000).

9. J. P. Mbelek et M. Lachièze-Rey, Possible evidence from laboratory measurements for a latitude and longitude dependence of G, Gravitation and Cosmology, 8, 331 (2002).

10. Khalilov E.N. About possible reason of variations of gravitational constant. Science without borders, Vol.1, ICSD/IAS H&E. Innsbruck, 227-243 (2004).

11. Schlamminger S, Holzschuh E, Kundig W. Precision Electromagnetic Measurements Digest, Materials of Conference: Precision Electromagnetic Measurements Digest, Sydney, NSW, Australia, 05/14/2000 - 05/19/2000, 693 – 694 (2000).

12. Khalilov E.N. Method for recording low-frequency gravity waves and device for the measurement thereof. Patent of PCT. WO 2005/003818 A1., Geneva, (13.01.2005).

13. Khain V.E., Khalilov E.N. Tideless variations of gravity before strong distant earthquakes. Science Without Borders. Volume 2. 2006/2006. ICSD/IAS H&E, Innsbruck, 319-339, (2006).

14. Elsasser W.H. Convertion and stress propagation in the upper mantle. In: Appl. Modern Phys. Earth Planet. Inter. N.Y., Willey, 223-246, (1969).

15. Lehner F.K., Li V.C., Rice J.R. Stress diffusion along rupturing boundaries. J.Geophys. Res., v.86, N B1, 6155-6169 (1981).

CHAPTER 3

Agreement

on the Establishment of the

International Scientific Cooperation Platform

ICEP – INTERNATIONAL COOPERATION FOR EARTHQUAKE PREDICTION

TERMS:

EISCP – Agreement on the Establishment of the International Scientific Cooperation Platform;

ICEP – INTERNATIONAL COOPERATION FOR EARTHQUAKE PREDICTION;

Station ATROPATENA – Station of Forecasting of Earthquakes ATROPATENA;

Station ATROPATENA-ID – Station ATROPATENA in Province Yogyakarta of Indonesia;

GNFE – Global Network of Forecasting of Earthquakes;

Full member of GNFE – Owners and users of station ATROPATENA, having access to Central Database GNFE and management of station;

IASHSE – International Academy of Science Health and Ecology;

Associative member of GNFE – Participants GNFE having access to operative forecasts of earthquakes and to system "Preview" of Central DATABASE of GNFE;

Member of GNFE – Participants of GNFE having access only to operative forecasts of earthquakes;

User – Participants GNFE having access only to the general scientific and technical information and news on activity of a network and the previous forecasts of earthquakes;

Owner – Owner of Station ATROPATENA;

The user of Station ATROPATENA – the organization using station ATROPATENA;

Owner of GNFE – the Organization enjoying the right of possession of intellectual property of GNFE technology, the property of the central database and control system of GNFE (SRIPSE);

General Director of GNFE – The person who controls and coordinates work of GNFE, appointed by Owner of GNFE;

AOIP – The author and the owner of intellectual property of technology of GNFE (Prof.Dr. Elchin Khalilov);

Control Centre of GNFE (CC) – Administrative and scientific and technical structure operating work of GNFE;

Central DATABASE (CDB) – DATABASE of GNFE;

Regional station (RS) – Station ATROPATENA placed in specific region;

Regional Director (RD) – The person who controls and coordinates of work of Regional Station;

Regional Database (RDB) of GNFE – DATABASE of regional station ATROPATENA;

SRIPSE – Scientific Research Institute of Prognosis and Studying of Earthquakes in Baku (Azerbaijan);

1.) Participants:

1.1. The agreement is signed by:

– President of International Academy of Sience HSE Prof. Dr. Walter Kofler (Innsbruck, Austria).

– General Director of GNFE Prof.Dr. Elchin Khalilov – General Director of Scientific Research Institute of Prognosis and Studying of Earthquakes SRIPSE (Baku, Azerbaijan).

– Participant of GNFE.

2.) Notation of the program: "International Cooperation for Earthquake Prediction (ICEP)".

3.) Relevance

The catastrophic impact of earthquakes on human life and resources on this planet is undisputable and due to the world-wide population increase and fast communication and information technologies has never been that visible and threatening before.

In principle two main reasons can be made responsible for the high amount of casualties and the enormous material damages:

– Seismic instable buildings;
– Missing Earthquake Forecasts allowing organized evacuations and disaster management;

If the first reason in many respects is connected with social standards, the second factor depends mainly on the lacking efficiency of the development of technologies to predict earthquakes. Solving the problem of forecasting earthquakes would allow governmental and other authorities as well as the affected population to take appropriate actions in time.

4.) Objectives

General purpose of this agreement is to establish a long-term cooperation platform between the nominated and future partners to improve the mutual scientific knowledge about earthquake prediction technologies and to assist the regional and national authorities putting into practice efficient earthquake disaster management by supplying them with earthquake forecasts.

Specific objectives include:
(a) To produce, place and constantly use the earthquake forecasting stations ATROPATENA® (developed and created by the Scientific Research Institute of Prognosis and Studying of the Earthquakes (SRIPSE) of the International Academy of Science H&E in the countries of all participants of this program;
(b) To create a directly linked network of collected ATROPATENA® data accessible for all participants anytime via internet;
(c) To create an international operative warning platform for possible risks of strong earthquakes;
(d) To improve quality and diversity of researching of gravitational and other effects preceding strong earthquakes at different distances from earthquake epicenters;
(e) To improve quality and diversity of researching of existing technologies of earthquake forecasting in general and to create new technologies through collaborative studies;
(f) To jointly publish new cognitions and knowledge in relevant journals all over the world;
(g) To provide new education and research opportunities for scientists of the participating institutions;
(h) To study the geological, geophysical, meteorological, biological, cosmic and other factors which allow earthquake prediction;

5.) Agreements on implementation and terms of cooperation

(a) GNFE is at its heart a network of ATROPATENA® short-term earthquake forecast stations connected to each other via a constantly online, encrypted internet-gateway (secure ftp hosted by a special server under own control at the center in Baku, Azerbaijan);

(b) Control Center and base station of GNFE is the ATROPATENA® station situated in Baku at the Institute of Forecasting and Studying the Earthquakes (Republic of Azerbaijan);

(c) All stations are supposed to be under independent control of the participating institutions;

(d) All stations ATROPATENA surely joining network of GNFE are also cells of GNFE network;

(e) All owners and users of stations ATROPATENA are obliged to sign EISCP and the bilateral agreement with GNFE about conditions and rules of participation in GNFE network;

(f) After inclusion of stations ATROPATENA in GNFE network, a priority of management of stations passes to Control Center of GNFE;

(g) After inclusion of stations in GNFE network its localization and orientation cannot be changed by the owner or the user without the permission of General Director of GNFE;

(h) All collected data is to be sent immediately to the Central DATABASE in USA by means of GNFE software where all data is archived;

(i) All participating organizations have constant and full access to this mentioned database via internet;

(j) An Internet site of GNFE provided and maintained by the base station in Baku will inform the public about the program, its goals, activities and participants – in order to avoid mass panics, which can substantially complicate actions of regional and governmental authorities, information's about earthquake predictions will be given ONLY to official authorities. All data are highly confidential and no direct public information nor any information to mass media or other non-participants will be given out by none of the participating institutions and partners;

(k) Earthquakes forecasts will be given to third parties ONLY by the GNFE base station in Baku and ONLY after prior information to all participating institutions and partners via e-mail;

(l) The GNFE base station in Baku will use for ALL alerts provided for third parties uniquely a still-to-be-designed earthquake prediction template on whose text and appearance all participating institutions and partners have to agree;

(m) Earthquake forecasts are provided on basis of the interpretation of the collected data coming from all GNFE stations. During confirmation of earthquake predictions, the results of interpretation from all the participants of GNFE are to be taken into consideration;

(n) Archive information about earthquake forecasts which have already taken place can be given to mass media ONLY on basis of a written consent of the Control Center of GNFE signed by General Director of GNFE Prof. Elchin Khalilov;

(o) As common language for all communication, internet presence, publishing etc. English is used as unique language;

(p) New participating institutions and partners are explicitly welcome and can be approved by signing this agreement after a prior consent of the Board of the Program (see topic 7a) and after having signed a contract with the "Scientific Research Institute of Prognosis and Studying of the Earthquakes" (SRIPSE) about the purchase and/or use of an ATROPATENA® station;

(q) Absolute and unique owner of the intellectual property concerning all technologies related to the ATROPATENA® stations and GNFE is the "Scientific Research Institute of Prognosis and Studying of the Earthquakes" (SRIPSE);

(r) All participating institutions and partners running an ATROPATENA® station are absolute or partial owners of their station, independently run their station within the limits established by the special agreement with GNFE or charter of GNFE and represent GNFE in their region.

(s) Regional director of station ATROPATENA is appointed by the owner of the station and is affirmed by GNFE director;

(t) All mutual legal and financial relations between a participating institution or partner and SRIPSE are regulated on basis of bilateral contracts;

(u) Any additional terms of cooperation or agreements have to be mutually discussed and agreed upon in a written consent only. If it seems to be useful, such additional specifications can be matter of an appendix to this agreement.

6.) Time Schedule

7.) Management Structure

(a) Executive organ of GNFE is the Board of the GNFE consisting of one representative to be nominated by each participating institution or partner.

(b) General Director of GNFE and chairman of the Board of the Program is Prof.Dr. Elchin Khalilov. He realizes all matters related to partner coordination, data collection and interpretation, methodical and scientific management and coordination, public relations, program promotion, new partner attraction etc.

(c) ICSD/IAS H&E and its president Walter Kofler support ICEP, the Board of the GNFE and its General Director through their widespread organisation and contacts.

(d) The Board of the Program (BP) decides about:

- Any alteration, addition etc. to the ICEP Program;
- Confirmation and modification of GNFE charter;
- Approval of GNFE annual reports;
- Confirmation of the long-term program of GNFE development;
- Substructures to be established;
- Publishing;
- Realization of conferences, meetings and workshops;

(e) General Director of GNFE possesses the exclusive right of the veto to the decision of Board if the decision of Board can cause essential damage to safety and efficiency of GNFE work.

(f) Decisions of the Board of the Program (BP) can be taken via e-mail or in personal meetings of the Board but only on behalf of written documents.

(g) All decisions of the Board of the Program (BP) are to be taken by a simple majority and must be communicated immediately to every participating institution or partner.

(h) Decisions of board cannot concern the property rights and intellectual property of the owner of GNFE technology.

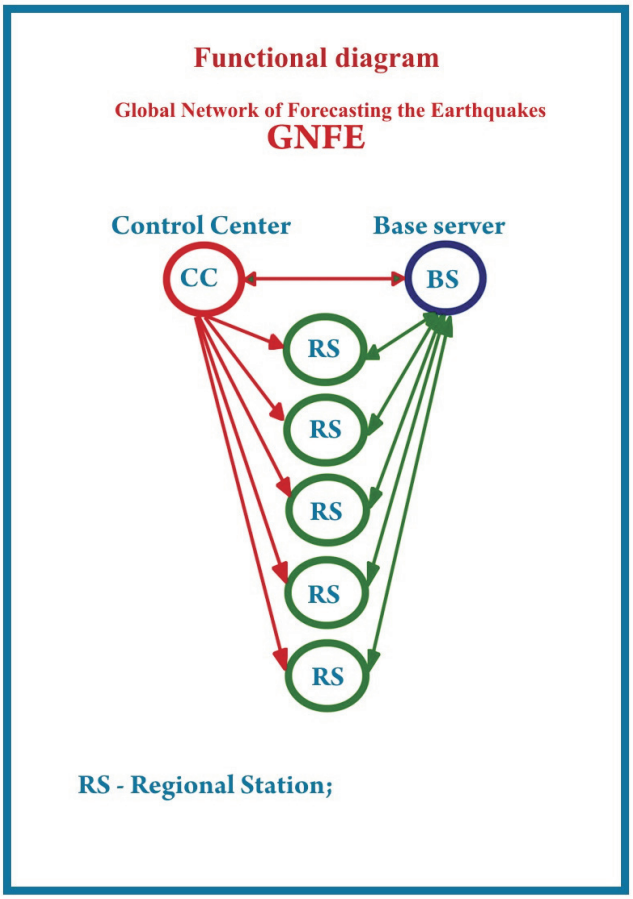
8.) Contact Address of GNFE

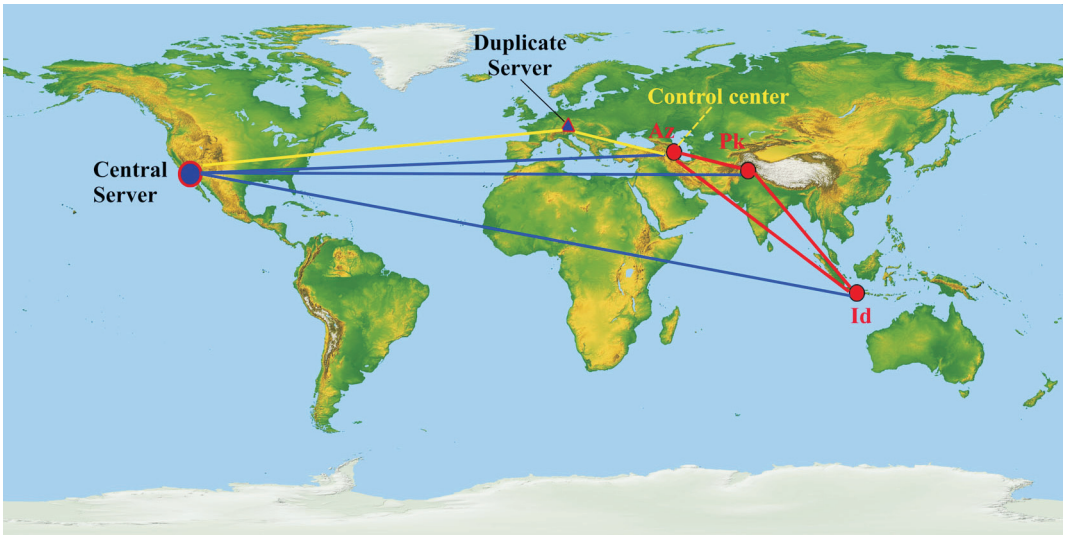
Control Center of GNFE, Scientific Research Institute for Prognosis and Studying of the Earthquakes
General Director of GNFE: Prof. Dr. Elchin Khalilov
F. Ibrahimbeyov St. 19/21, Baku, AZ1065, Azerbaijan Republic
Tel.: /994 12/ 439-83-14
Fax: /994 12/ 438-80-65
e-mail: gnfe@seismonet.org
www.seismonet.org

9.) Renewal, Termination and Amendments

This agreement comes into effect from the date of signing and shall remain in force until either party notifies the other of its wish to terminate. Such notice of termination shall be given at least six months in advance of the proposed date of termination. In the event of termination, the parties agree to part with goodwill and without recrimination.

This agreement is signed by all participants of the program, and each participant of the program got one copy of the signed original of this agreement.





Map of the Global Network of Forecasting the Earthquakes - GNFE

● – **Stations "ATROPATENA".**

CHAPTER 4

COMMUNIQUÉ

on issues of Global Changes of Geological Environment "GEOCHANGE" for presentation to UNO, European Union, International Organizations and Governments of States

This communiqué is developed on behalf of heads of international organizations, Universities, scientific institutes and centers, scientific–technical companies and scientists of different countries.

This communiqué was developed and issued by the World Organization for Scientific Cooperation (WOSCO) and the initiative team under leadership of Victor Khain, Academician of the Russian Academy of Sciences, Prof., Doctor of geological-mineralogical sciences and Elchin Khalilov, Academician of the IAS H&E (Austria) and RANS, Prof., Doctor of geological-mineralogical sciences.

During the last years rather positive tendency of active measures and undertaking of specific actions directed to lessening the negative impact of human technogenic activity on global climate changes is observed. Constructive position on this issue of the European Union, international organizations, governments of many countries, scientists and leaders of business is completely supported and welcomed by the initiative team of this communiqué.

"GEOCHANGE" is understood in this communiqué as natural changes of geological environment under impact of endogenic. exogenic and cosmic factors, particularly, solar activity and other

processes taking place within Solar system and which have negative consequences for stable development of humanity.

- Presently, multiple scientific facts confirming increasing changes of geological environment of universal character have been collected. These changes indicate about acceleration of growth rate of the Earth's geodynamic activity which is particularly expressed in earthquakes and volcano eruptions. High risk of underestimating the scale of impact of geologic factors on global warming is evident. Activation of geodynamic processes, namely volcano eruptions, is accompanied by intensification of processes of degassing of the Earth mantle and emission into the atmosphere of big quantities of CO_2 and other endogenous gases which are responsible for greenhouse effect.
  Thus, in our opinion, existing prediction estimates of rates of global climatic changes are underestimated, and this may lead to non-sufficient justification and effectiveness of adopted decisions at international level.

- Alarming facts about drastic acceleration of drift of magnetic poles of the Earth since 1990 have not only catastrophic consequences for global climatic changes but also witness about existing changes in energetic processes on the level of internal and external nucleus of the Earth, responsible for formation of magnetic pole of our planet. Simultaneously, decrease of magnetic intensity of the Earth is observed. Thus, for the last 25 years it decreased by 1,7% in average, and in some regions, for example, in the Southern part of the Atlantic ocean, by 10%. One would like to focus attention on the point that magnetic field of the Earth generates magnetic screen from power lines, protecting biosphere of the Earth from hard cosmic radiation, which is destructive for biological form of life.

- It is necessary to take into account the fact of increase of angle of solution of cusps (polar holes in magnetic sphere to the North and to the South), which by the mid 90s reached 45^0. Radiation material of solar wind and interplanetary space was directed towards expanded holes, i.e. huge number of additional cosmic substance and energy started to fall to polar areas, which leads to "heating" of polar caps. Particularly, drift of magnetic poles of the Earth and opening of "cusps" lead not only to increased penetration of streams of hard cosmic radiation directed towards the Earth surface, but to redistribution of temperature in its upper layers too. Such changes may lead to redistribution of areas of formation of cyclones and anticyclones, and thus, impact on global climatic changes. This important factor is not taken into consideration in assessment of impact of exogenic factors on global climatic changes.

- According to researches of scientists of many countries of the world conducted during many years, increase of volcanic and seismic activity has high correlation and physical connection with increase of solar activity. Researches of leading scientific centres of the world indicate approach of abnormally high by amplitude next the 24^{th} 11-year cycle of solar activity, which peak is predicted by 2012. During this period peaks of some cycles of solar activity of other orders also coincide, this will further higher emission of solar energy into surrounding space. By predictions of scientists, rise of solar activity will be accompanied by significant increase of seismic and volcanic activity, its peak is predicted for period from 2012 to 2015.

- Meanwhile, increase of volcanic and seismic activity, in contrast to global climatic changes, may lead to instant catastrophic consequences for entire regions of our planet, many people will die, population of big territories will be

deprived of shelter and food, economy of states will be destroyed and large scale epidemics of serious infectious diseases will be spread.

- Presently, the world community is not ready to oppose such possible aggravation of situation. Meanwhile, periods of significant increase of endogenic activity at geologic life of our planet were observed many times and, according to many geologic indicators next such period is already starting.

- Single instances of strong earthquakes and eruptions of volcanoes, leading to large numbers of victims and destructions in one or another country are usually accompanied by wide international assistance of different humanitarian international organizations and individual states. Thus, decisions are usually adopted by states themselves and organizations, and distinct intergovernmental mechanism of coordination and restoration of territories subjected to cataclysms is absent. Meanwhile, during the period of natural cataclysms of large scale, special, legal, administrative and financial mechanism and international coordinating body for management and coordination and accomplishment of rescue, restoration and other international measures in the regions of natural calamities will be required.

- Scientific knowledge is accumulated in many countries and experience of long term, middle term and short term prediction of different natural cataclysms is available. At the same time, in most cases there aren't definite rules for making decisions and particular acts of state structures in case of coming of forecasts about possible natural cataclysms. The incorrect decisions and not-coordinated actions of governmental and international structures, during receiving the forecasts, can result in panic among population and disorganization of actions of state

structures and rescue services. It does not only decrease effectiveness of preparation to natural cataclysms, but can lead to the complication of social and moral and psychological situation in the regions of the expected cataclysms.

TAKING INTO ACCOUNT ABOVE MENTIONED INITIATIVE TEAM ON ISSUES OF GLOBAL CHANGES OF GEOLOGICAL ENVIRONMENT "GEOCHANGE" PROPOSES:

1. *To adopt frame convention of UNO on «Global changes of geological environment» and to establish at UNO special Intergovernmental Commission on this problem.*

2. *To develop and confirm International Program of UNO on study and prediction of global changes of geological environment.*

3. *To develop and confirm the international and legal norms and mechanisms for effective management and coordination of actions of governments of countries and international humanitarian organizations in case of receiving the forecasts about natural cataclysms and coming of emergency situations as a result of global changes of geologic environment.*

4. *To establish at UNO International Centre on prediction of natural cataclysms and quick notification of countries about arising risks.*

REFERENCES

Relation between solar activity and seismic and volcanic activity

- Shumilov, O. I., Kasatkina, E. A., Raspopov, O. M., Turunen, E., Jacoby, G., & Morner, N.A. Influence of Cosmic Ray Intensity Modulated by Solar Activity and Volcanic Eruptions on the Climate. The solar cycle and terrestrial climate, Solar and space weather Euroconference (1 : 2000 : Santa Cruz de Tenerife, Tenerife, Spain) Proceedings of the 1st Solar and Space Weather Euroconference, 25-29 September 2000, Santa Cruz de Tenerife, Tenerife, Spain. Edited by A. Wilson. Noordwijk, Netherlands: ESA Publications Division, 2000 xi, 680 p. ESA SP, Vol. 463, ISBN 9290926937, p.547.
- Abdurakhmanov A.I., Firstov L.P., Shirokov V.A. Possible connection of volcanic eruptions with 11-year cyclicality of solar activity. In the book Bulletin of volcanic stations. Moscow, Science, 1976, No.52, p.3-10.
- Gadjiyev Y.A., Dadashev R.M., Sapunov A.G. Periodicity of mud volcanoes eruptions and solar activity. Transactions of Azerbaijani Academy of Science, 1985, v.12, No.11, p.38-42.
- Ivanov-Kholodniy G.S. Solar activity and geophysical processes. Earth and the Universe. 2000, No.1, p.30-36.
- Kalinin Y.D. Solar conditionality of days duration change and seismic activity. Krasnoyarsk, Institute of Physics of Siberian Department of USSR Academy of Science, 1974, p.23.
- V.Y.Khain, E.N.Khalilov. Space-Time regularities of seismic and volcanic activity. Bourgas, 2008, 304 p.
- Lursmanashvili O.V. About possibility of influence of solar activity upon distribution of Caucasian earthquakes. Reports of Georgian Academy of Science, 1972, v.65, No.2, p.309-312.
- Lyatkher V.M. Variation of seismic regime of Earth under the influence of solar cycle length changes. Earth Physics, 2000, No.10, p.93-96.
- Mekhtiyev Sh.F., Khalilov E.N. About possibility of detection of connection between volcanic eruptions and solar activity. Volcanology and Seismology, M., No.3, 1985, p.64-67.
- Valyayev B.M., Telepin M.A., Berejnaya E.A., Vakhtangashvili V.Kh. and others. Correlation of mud volcanic activity with solar activity (on example of Akhtal volcano) - Lectures of USSR Academy of Science, 1980, v.255, No.5, geology, p.1204-1207.

- Sitinskiy A.D. About influence of solar activity upon Earth seismicity. USSR Academy of Science reports, v.208, 1973, No.5.
- Sitinskiy A.D. Dependence of Earth seismicity upon solar processes in interplanetary medium and atmosphere. In book Atlas of temporary variations of natural, anthropogenic and social processes. 2nd volume. M., Scientific World, 1998, p.70-72.
- Simpson I.F. Solar activity as a triggering mechanism for earthquakes. Earth and Planet, Sci. Letter, 1968, v.3, No.5, p.417-425.
- Stoyko A., Stoyko N. Rotation de la terra, phenomenes geophysiques et activite du soleil. – Bull. Cl. Sci. Acad. Roy.Belg., 1969, t.55, p.279-285.
- Tzirel S.V. About possible dependence of volcanic activity upon solar activity. In book Atlas of temporary variations of natural, anthropogenic and social processes. 3rd volume, M., Yanus-K, 2002, p.254-256.
- Mekhtiyev Sh.F., Khalilov E.N. Rhythms of Earth Cataclysms. Baku, Elm, 1988, 108 pp.
- Sobolev G.A., Shestopalov I.P., Kharin Y.P. Geoeffective solar flashes and seismic activity of the Earth // Physics of the Earth. 1998. №7, p. 85–90.
- Rogojin I.P., Shestopalov I.P. Century cycles of seismicity of the Earth and seismic safety of the atomic power station. Nuclear strategy, Moskow, №29, 2007, p.118.
- Gokov, A.M. Geomagnetic and Seismic Activities Relationship. Microwave & Telecommunication Technology, 2007. CriMiCo 2007. 17th International Crimean Conference, 10-14 Sept. 2007 Page(s): 841–842. Digital Object Identifier 10.1109/CRMICO.2007.4368969.
- Barsukov O.M. Solar's badgers of flash, the sudden beginnings and earthquakes. News of the Academy of Sciences of the USSR. Physics of the Earth., 1991г., N12. p. 93-97.
- Gousheva, M. N.; Georgieva, K. Y.; Kirov, B. B.; Atanasov, D. On the Relation Between Solar Activity and Seismicity. RAST 2003: Proceedings of the International Conference on Recent Advances in Space Technologies, held November 20-22, 2003, in Istanbul, Turkey. Edited by S. Kurnaz, F. Ince and S. Onbaşioglu. IEEE Catalog Number 03EX743. ISBN: 0-7803-8142-4. Library of Congress Catalog Card Number 2003109595. Published by the Institute of Electrical and Electronics Engineers, Inc., 2003, p.236
- Zhang, Gui-Qing. Relationship between global seismicity and solar activities Acta Seismologica Sinica, Volume 11, 1998, Issue 4, pp.495-500.

- Odintsov S., Boyarchuk K., Georgieva K., Kirov B. and Atanasov D. Long-period trends in global seismic and geomagnetic activity and their relation to solar activity.
  Physics and Chemistry of the Earth, Parts A/B/C, Volume 31, Issues 1-3, 2006, Pages 88-93.
- S.D. Odintsov, G.S. Ivanov-Kholodnyi, K. Georgieva, 2007, published in Izvestiya Rossiiskoi Akademii Nauk. Seriya Fizicheskaya, 2007, Vol. 71, No. 4, pp. 608–610.
- Kirov. B. Georgiyeva. K. Solar cycle influence on the seismic activity. Bulgarian Journal of Physics 27 No 2, 2OOO, p.35-42.
- WANG Zhongrui, Song FENG and TANG Maocang. A Relationship between Solar Activity and Frequency of Natural Disasters in China. Advances in atmospheric sciences. Vol.20, No 6, 2003, PP. 934–939.
- Schulenberg K. Correlation Between Time-Specific Solar Activity and Subsequent Earthquakes. Presented at WPGM 2006 in Beijing, China on Thursday July 27th.

http://theraproject.com/db5/00472/theraproject.com/_download/WPGMpresentation.pdf.

Relation between solar activity and global climate change

- Athaturov M.E., Budiko M.I., Vinnikov K.Y. and others. Volcanos, stratospheric an aerosol and a climate of the Earth. L: Hydrometeoixdat, 1986, 256 p.
- Budiko M.I. The climate fluctuation - L: Hydrometeoizdat. 1974, 280 p.
- Budiko M.I. The problem of carbon dioxide. L: Hydrometeoizdat. 1979, 59.
- Budiko M.I. The influence of the volcanic eruption on the climate. Meteorology and Hydrology, 1984, № 3, p. 5-11.
- Cadle R.D. Volcanic emission of holides and sulfur compounds to the troposphere and stratosphere. - J. Geophys. Res., 1975, vol. 80, N12, p. 1650-1652.
- Gerlach N.M. Evolution of volcanic gas analysis from Surtsey volcano, Iceland, 1964-1967. J. Volcan. Geotherm. Res., 1980, N 8, p. 191-198.
- Khain V.Y., Khalilov E.N. Space-Time regularities of seismic and volcanic activity. Burgas, SWB, 2008, 304 p.
- Khain V.Y., Khalilov E.N. Regularity of spatial-temporary distribution of volcano eruptions. International Academy of Science. II&E. Science without borders, Vol. 1, 2003-2004, ICSD/IAS, Innsbruck, pp. 243-251.
- Intergovernmental Panel on Climate Change (IPCC): www.ipcc.ch/

Accelerating of Earth's Magnetic Poles

- Dr.Tony Phillips. Responsible NASA official: John M. Horack. Earth's Inconstant Magnetic Field. Our planet's magnetic field is in a constant state of change, say researchers who are beginning to understand how it behaves and why. The Science and Technology Directorate at NASA's Marshall Space Flight Center.
- http://science.nasa.gov/headlines/Y2003/29dec_magneticfield.htm
- V.V. Kuznetsov, Geomagnetism. North Magnetic Pole
- 2006, published in Geomagnetizm i Aeronomiya, 2006, Vol. 46, No. 2, pp. 280–288.
- Natural Resources Canada. Geological Survey of Canada. Geomagnetism. North Magnetic Pole. http://gsc.nrcan.gc.ca/geomag/nmp/northpole_e.php
- Kerton, Adrian K. Climate Change and the Earth's Magnetic Poles, A Possible Connection. Energy & Environment, Volume 20, Numbers 1-2, January 2009 , pp. 75-83(9) Publisher: Multi-Science Publishing Co Ltd.
- Earth's North Magnetic Pole Drifting Quickly. American Geophysical Union: http://www.agu.org

http://www.redorbit.com/news/space/325579/earths_north_magnetic_pole_drifting_quickly/

- By Mark Floyd. Movement of Earth's North Magnetic Pole Accelerating Rapidly. Source: Joe Stoner.
- http://oregonstate.edu/dept/ncs/newsarch/2005/Dec05/magneticnorth.htm
- Connection found between tropical rainfall and Earth's magnetic field. http://planetearth.nerc.ac.uk/news/story.aspx?id=296
- Mads Faurschou Knudsen and Peter Riisager**.** Is there a link between Earth's magnetic field and low-latitude precipitation? *Geology*; January 2009; v. 37; no. 1; p. 71-74; DOI:10.1130/G25238A.1 © 2009 Geological Society of America
- Khain V.Y., Khalilov E.N. Influence of cyclicity of volcanic eruptions on global climate changes. In book: /Khain V.Y., Khalilov E.N. Space-Time regularities of seismic and volcanic activity. Burgas, SWB, 2008, 304 p./, pp.214-229.
- Dyachenco A.I. Magnetic poles of the Earth. The Moscow center of continuous mathematical education. Moscow, 2003, 48 pp.
- Brian Vastag. North Magnetic Pole Is Shifting Rapidly Toward Russia. National Geographic News. December 15, 2005, USA.
- http://news.nationalgeographic.com/news/2005/12/1215_051215_north_pole.html

- Dmitriev A.N. Planetophysical state of the Earth and life. IICA Transactions, Volume 4, 1997. http://www.soulsofdistortion.nl/earth1.html

The document is developed under direction:

World Organization for Scientific Cooperation
"Science Without Borders"
www.wosco.org
Scientific Coordinating Committee

Chairman of Initiative team

Victor Yefimovich Khain
Honorary President of WOSCO,
Academician of Russian Academy of Sciences,
Honored Professor of MSU after M. V. Lomonosov,
Doctor of geological-mineralogical sciences,
Honorary President of International
Academy of Sciences H&E (Austria, Innsbruck),

Responsible Secretary of Initiative team

Elchin Khalilov
Vice-President of WOSCO,
Academician of International Academy of Sciences H&E
and Russian Academy of Natural Sciences (Moscow, Russia),
Professor, Doctor of geological-mineralogical sciences,
Vice-president of International Academy of Sciences H&E (Innsbruck, Austria),
General Director of Global Network of Forecasting the Earthquakes

CHAPTER 5

HISTORY OF GLOBAL NETWORK OF FORECASTING THE EARTHQUAKES (Photo Album)

The first model of station of forecasting of earthquakes ATROPATENA, 2005

Meeting in a **Residence His Royal Highness**
Sultan of Yogyakarta Hamengku Buwono X.
Yogyakarta, 2006.

From left to right: **His Royal Highness Sultan of Yogyakarta Hamengku Buwono X.**
and **Prof.Dr. Walter Kofler –** President of the International Academy of Science H&E (Austria).
Yogyakarta, 2006.

From left to right: **Prof.Dr. Elchin Khalilov, His Royal Highness Sultan of Yogyakarta Hamengku Buwono X.** and **Dr. Andreasta Meliala.** Discussion of a problem of accommodation of earthquakes forecasting stations "ATROPATENA" in Province Yogyakarta of Indonesia.
Yogyakarta, 2006.

From left to right: **Mr.Bayudono –** Head of Regional Planning Board (Yogyakarta, Indonesia), **Mr.Tri Harju Ismaji –** Regional Secretary of the Yogyakarta Province**, Prof.Dr. Walter Kofler –** President of the International Academy of Science H&E (Austria)**, Prof.Dr. Elchin Khalilov –** General Director Scientific Research Institute of Forecasting and Studying of Earthquakes. Discussion of a problem of accommodation Stations of forecasting of earthquakes "ATROPATENA" in Province Yogyakarta of Indonesia. (Nicosia, Cyprus, 2007).

Delegation of Yogyakarta (Indonesia) on International Symposium «NATURAL CATACLYSMS AND GLOBAL PROBLEMS OF THE MODERN CIVILIZATION» (Baku, On September, 24-27th 2007)

His Royal Highness Sri Paku Alam IX – First Vice-governor of Special Region Yoguakarta of Indonesia. Report on Symposium «NATURAL CATACLYSMS AND GLOBAL PROBLEMS OF THE MODERN CIVILIZATION», (Baku, On September, 24-27th 2007)

Prof.Dr.Victor Khain – Academician of Russian Academy of Sciences, Honorary President of International Academy of Science, HSE. Report on Symposium «NATURAL CATACLYSMS AND GLOBAL PROBLEMS OF THE MODERN CIVILIZATION», (Baku, On September, 24-27th 2007)

Delegation of Pakistan on International Symposium «NATURAL CATACLYSMS AND GLOBAL PROBLEMS OF THE MODERN CIVILIZATION» (Baku, On September, 24-27th 2007)

Discussion of a problem of accommodation of earthquakes forecasting stations of "ATROPATENA" in Pakistan. International Symposium «NATURAL CATACLYSMS AND GLOBAL PROBLEMS OF THE MODERN CIVILIZATION» (Baku, On September, 24-27th 2007)

During the ceremony of opening of station ATROPATENA-Pk:
From right to left: **Dr. Ishfaq Ahmad –** Advisor on Science & Technology in the Planning Commission with the status of Minister of State of Pakistan, President of Pakistan Academy of Sciences; **Prof. Dr. Elchin Khalilov –** Vice-President of International Academy of Science H&E (Austria), General Director of Scientific Institute of Earthquakes Prognosis (Azerbaijan), Director of Global Network of Forecasting the Earthquakes; **Prof.Dr. M.Qasim Jan –** Secretary General of Pakistan Academy of Sciences, Rector of Quaid-i-Azam University (Islamabad, 2009).

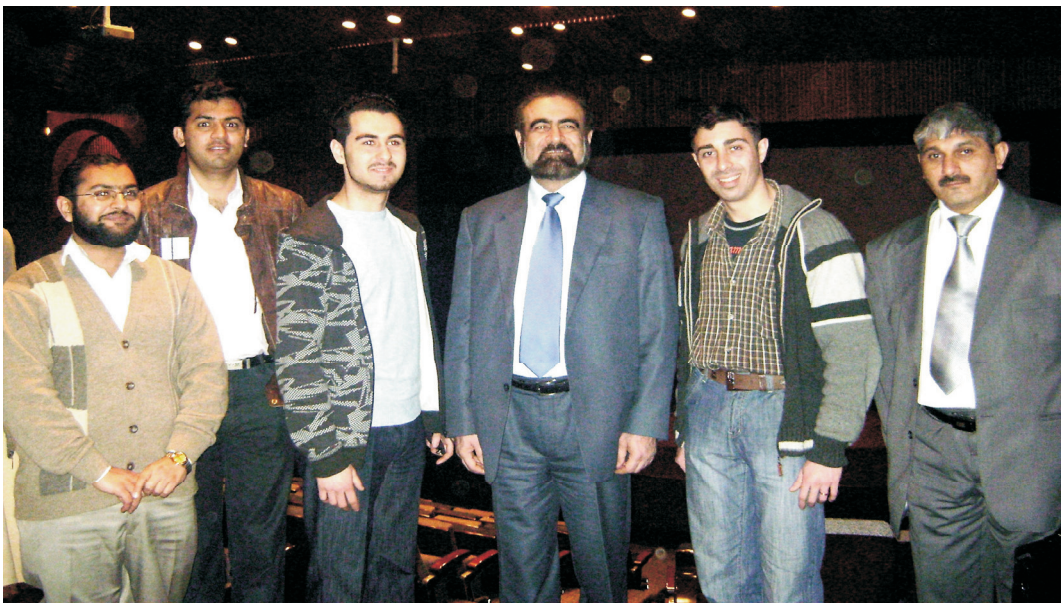
During the ceremony of opening of station ATROPATENA-Pk.
Room of station ATROPATENA-PK in Center for Earthquakes Studies (Pakistan, 2009)

Discussing a problem of application of stations of forecasting of earthquakes "ATROPATENA-Pk" in Pakistan (2009).

From left to right: **Dr. Ahsan Mubarak** – Director of Center for Earthquakes Studies, **Dr. Ishfaq Ahmad** – Advisor on Science & Technology in the Planning Commission with the status of Minister of State, President of Pakistan Academy of Sciences, **Prof.Dr. Elchin Khalilov** – General Director of Global Network of Forecasting the Earthquakes and his assistant – **Mr.Farid Khalilov.** (Islamabad, 2009).

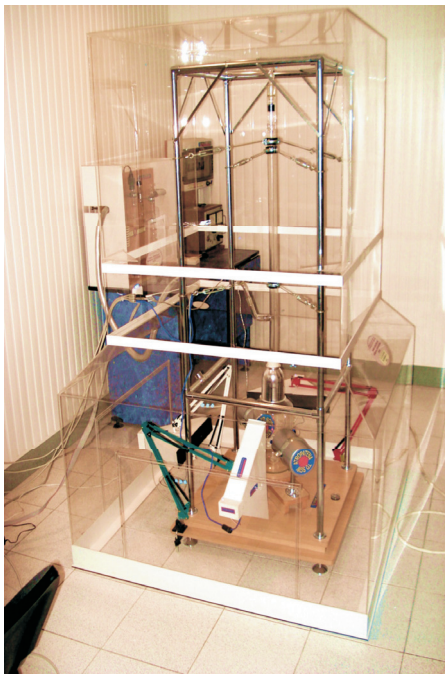
Discussion of first results at recording of station ATROPATENA-Pk.
Islamabad, 2009.

From left to right: **Dr. Ahsan Mubarak –** Director of Center for Earthquakes Studies (Pakistan),
Dr. Ishfaq Ahmad – Advisor on Science & Technology in the Planning Commission with the status of Minister of State, President of Pakistan Academy of Sciences,
Dr. Eynulla Madatov – Ambassador of Republic of Azerbaijan in Pakistan**,**
Prof.Dr. Elchin Khalilov – General Director of Global Network of Forecasting the Earthquakes (Azerbaijan). Islamabad, 2009.

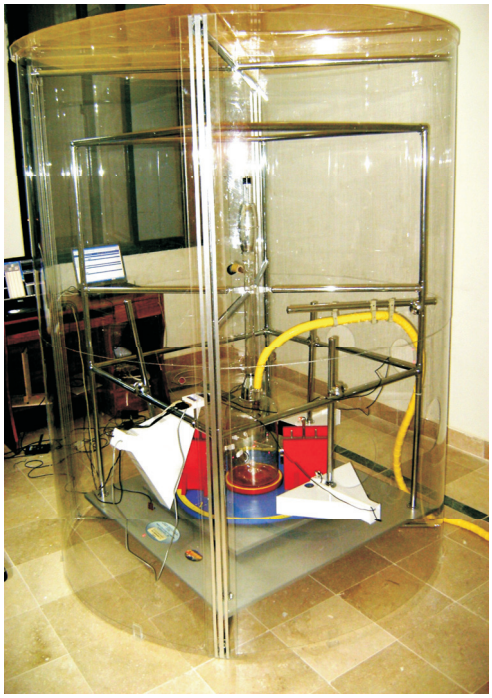


Prof.Dr. Elchin Khalilov with young scientists and specialists. Islamabad, 2009.

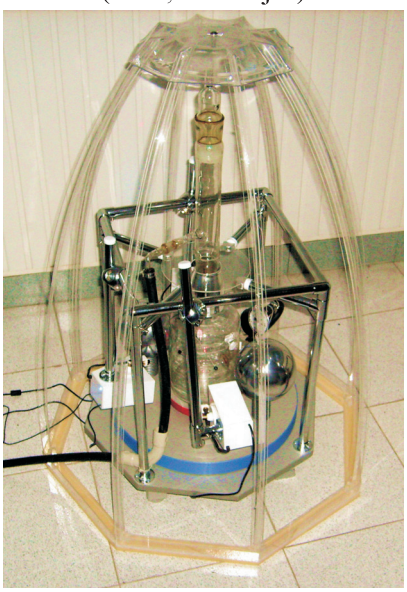
In the center – **Dr. Ahsan Mubarak** (Pakistan) and **Prof.Dr. Elchin Khalilov** (Azerbaijan) with group of experts - participants of project ATROPATENA. Islamabad, 2009.



Station ATROPATENA-Az
(Baku, Azerbaijan)



Station ATROPATENA-Pk
(Islamabad, Pakistan)



Station ATROPATENA-ID (Yogyakarta, Indonesia)

Academician, Prof.Dr. Elchin Khalilov

General Director of Global Network of Forecasting the Earthquakes, Vice President of International Academy of Science H&E (Austria, Innsbruck), Vice President World Organization for Scientific Cooperation (UK, London, www.wosco.org), General Director of Scientific Research Institute of Forecasting and Studying of Earthquakes (of Baku).

Control centre of the Global Network of Forecasting the Earthquakes – the Scientific Research Institute of Forecasting and Studying of Earthquakes (Baku).

Science Without Borders ®

International Publishing House "SWB",
(UK, Bulgaria, Turkey, Czech Republic)
Office in Bourgas: Bulgaria, city of Bourgas, 15-B "Khan Krum" Street
Office in London: EIC, 19 Kathleen Road, London, SW112JR,
United Kingdom of Great Britain and Northern Ireland
Phone: + 44 207 760 63 31;
Fax: + 44 207 691 95 60;
www.wosco.org
e_mail: publishing_house@wosco.org
www.seismonet.org
e-mail: gnfe@seismonet.org

Khalilov Elchin Nusrat
GLOBAL NETWORK OF FORECASTING THE EARTHQUAKES:
NEW TECHNOLOGY AND NEW PHILOSOPHY

Scientibic editor: ***Dr. Allen Simpson***
Technical editor: ***N.A. Ligina***
Computer imposition: ***A.L. Dukhanina***
Illustrator: ***G.K. Oxridski***

Date of an order: 05.03.2009
Order: 102/09
Offset printing
Conventional printer's sheet: 3,43
Copies of the book were printed: 1,000
London, UK

E.N. Khalilov. GLOBAL NETWORK OF FORECASTING THE EARTHQUAKES:
NEW TECHNOLOGY AND NEW PHILOSOPHY. *London, SWB, 2009, 65 p.*

www. wosco.org

www. seismonet.org

ISBN 978-9952-451-03-0


GNFE