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**THE NEW APPROACH ON THE ECOLOGICAL
CHANGES OF THE PLANET**

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2ECEES ABSTRACT

In 2008 at the IGC in Oslo we presented our view of the causes of the Earth's ecological problems [14, 13]. They have been recognized already as the results of human impact led to sharp increase in speed and in power of the natural processes manifold in all of the Earth's spheres.

Conventional views on this matter are based on models of the Earth as an isolated, self-regulated, independent body. We have proposed a more holistic view where the Earth is considered a part of an entire system, in constant energy exchange with its containing environment, - Space. The new approach was based on that uncontrolled human activity has caused disturbances to the Earth's energy system and to its natural interaction with the containing environment. Specifically it has led to increase in energy absorption from the environment and decrease in its energy release. Even then we concluded that the Earth excitation system has already come to self-sustained oscillation phase.

On this basis we had have come to a different view on global climate change and an answer to the question – where (and how) did this vast scale of required additional energy come from?

In our presentation in Oslo in 2008 the data on annual spread of energy through the planet, which are gathered by the strongest and catastrophic earthquakes in 20th century has been compared. They demonstrated the drastic increase of this energy (up to 12 times) since 1945 to 2008 in comparison to the period from 1900 to 1945, - before the nuclear explosions started [22]. Moreover, the lithosphere and even the planet's deepest structures were involved in the process, at the depths of 100 and even more than 400 km.

Geological (and associated climatological) processes require incomparably more energy to change their natural energy balance than is conceivable from scales of direct human impact.

To understand the role of human impact on geological processes [12] we first need to ask the question: where (and how) did the large amounts of energy associated with these processes come from? The current view of the "Greenhouse Gas" effect and emission of CO₂ as the main cause of global warming did not consider the full spectrum of associated abnormal changes in all of the Earth's physical spheres.

This paper reflects the recent studies, which have confirmed the correctness of our proposed in Oslo, in 2008, a new theory of the nature of environmental problems and necessity of the global geophysical system

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creation. For last 5 years, 2008 – 2014, these changes became more dramatic, demonstrated significant increase of the energy of seismic emission and number of deep-focus earthquakes.

The obtained data fully confirm our conclusions to which we came back in 2008 about self-sustained oscillation phase of the Earth excitation system also.

INTRODUCTION: Human impact on geological processes

The fact of ever-increasing and alarming global ecological changes, which were caused by human impact on the geological processes, has been recognized already.

But scale of this impact is not realized yet, which cause increase in speed and in power of the natural processes in lithosphere, hydrosphere and atmosphere manifold (in hundreds-fold and thousands-fold).

Our studies in this field commenced many years ago, and their results allowed us to understand, to a certain extent, a physical mechanism of negative technogenic effects. All this facts led to a conclusion that the ecological problems have turned out to be much more sensitive, complicated and delicate than they were assumed before, at first sight and even relatively small impacts can cause a trigger amplifying effect on the Earth natural processes, covering larger and larger areas, regions and entire continents. And any scale of the industrial activity should be controlled to avoid a disturbance of natural balance and a significant economical damage caused by it.

As a consequence it leads to sharp induced increase of natural disasters sometimes with unusual character (earthquakes, hurricanes, tornados, floods, landslides, fires, oil and gas reservoirs distractions, unusual behavior of lightings est.).

Scientific base of the researches

The scientific background of all our researches is based on the discovery of a new physical law governing the propagation and interaction of weak high frequency seismic signals, microseisms, with the medium registered by the State Committee on Discoveries and Inventions of the former USSR in March 1988, with priority from May 1979 (author – I. G. Kerimov) [10, 11, 18, 28, 29]. The IASPEI has published in International Handbook the results of our researches and the formula of discovery [17]; "Previously unknown regularity of changes in microseisms before an earthquake has been established, which stipulated that at distances that exceed the size of the epicentral zone a multi-stage increasing in the intensity [of microseisms is registered, with simultaneous decreasing of their main frequency, and there arise recurring impulses (zugs) of oscillations that are increasing in intensity and decreasing in time between their appearances, which are polarized in the direction of the epicenter of the future earthquake".

This discovery made possible the explanation of certain natural processes and serve as a stimulus for beginning the working out of a nonlinear theory of relation of weak signals with the medium. The results achieved may be used for solving on a new methodological basis a wide spectrum of problems: seismic events forecasting; diagnostics of medium stress state; revelation of the effects of induced seismicity; ecological control of large industry and other activity for minimizing and preventing the negative impact of induced effects on ecology and the environment; and creation of unified seismological and geophysical systems [15, 16, 19, 23, 24].

Unlike many specialists involved in the problems of ecology and environment protection of its physical and chemical pollution, we consider this problem from the point of view of energetical pollution of the medium, accumulation of additional power caused by non-controlled industrial activities. Changes of natural conditions and multiple negative effects afterwards are their consequences. This is the basic point of our proposals for control and management of negative technogenic effects.

At the first time these materials were presented at the International conference devoted to the problem of UNE impact on the seismicity and oil production, Baku, June 3, 1991. And then at the IUGG, Vienna, August 4, 1991, at the Regional meeting devoted to the problems of seismology and seismotectonics of Azerbaijan and Northern Iran, Tabriz, October 5, 1992, at the annual meeting of International council of CIS, devoted to the plasticity physics and materials destruction, Saint-Petersburg, March 6, 1994, at the International meeting

devoted to the problems of seismic-proof construction, Berlin June 7, 1994, at the meeting of working group, organized by NATO, devoted to the UNE environmental impact and stimulation of earthquakes, Moscow, November 8, 1994.

Today the environmental aspects are the most important scientific and social problems. As the statistical data accumulated and environmental impact had become more intensive, it became clear that the artificial activation aimed to some territory would not be limited with this territory, and after a certain period of time covers larger areas, touching practically all planet's spheres. These and other results have become the most powerful spur for close studying of the above problems [26].

Some main conclusions connected with the induced effects studies are:

- The new understanding of the medium's behavior as a dynamic, not a static object, the parameters and characteristics of which change constantly. New terms proposed by us connected with the development of the idea are as following: "geophysical medium", "active geophysical medium", "tension sensitivity of a medium", "active faults, - conductors of seismic and deformation power" (one of directions of their spreading can be considered as prior), etc.
- Study of the stress state of the medium using permanent testing by means of seismic and other geophysical fields allows to define the dynamics of its changes under the impact of natural or artificial factors;
- The studies proved that even at repeated low intensity external impacts that follow in certain consequence, the medium can change its characteristics and show high dynamic activity;
- Due to certain physical effects induced reactions differ from natural by much higher power;
- Appearance of induced seismic events can be caused by external impacts the power of which is low in comparison with the power of the earthquake itself;
- One of the most important conclusions is that high power events can appear even in areas that earlier were considered as low-seismic or even a-seismic. The intensity of the earth surface vibrations can be incomparably higher than forecasted levels. It can lead to huge damages, as seismic-proof constructions were considered against less intensive reactions.
- Induced events cause such a significant economical damage also because they are accepted as natural, no measures are taken to control and prevent them. As they have higher intensity of seismic events, they cause not only direct damages but years after cause additional expenses because of an artificial rise of costs for seismic-proof construction. But necessary measures to control technogenic effects would cost less.
- Divided into individual large, middle and small blocks, the medium has a special spatial-temporal reaction to external impacts depending on the degree of tension;
- The right selection of territory with low tense sensitivity to located industrial objects is one of the main aspects to control induced effects. Non-controlled industrial activity on the territory with high tense sensitivity, i.e. strong reaction to the external fields, leads to significant changes in seismicity reactions, activation of tectonic processes, increase of a medium's tension, appearance of vibration fields caused by elastic and non-elastic deformations;
- The data of geophysical equipment installed in tense sensitive places are quite effective: the registered signals are intensive even from remote events;

The experimental data

At our insistence in June 1991 in Baku was held an international conference where at first time we announced the data about the negative effects of nuclear explosions on the environment. We have presented evidences that, - as a results of their study conducted for many years, - the stress state of the medium had increased so that the responses of geophysical fields almost all over the planet have arose even after the usual industrial explosions, which differ much less power. The current President of the IUGG, Professor H. Gupta has participated at this meeting also.

Then at the IGC XXXI in Vienna in August 1991, we have presented at the first time evidences of abnormal changes in microseisms on the territory in radius of 1000-1500 km as a result of military operations (bombings) in Iraq. Herewith the number of small earthquakes in this area has increased by 2-3 times [25]. In connection with the data which we presented the international commission has been elected for study such induced effects, chaired by Professor H. Gupta, which appealed to all neighboring countries of Iraq with a

proposal to provide them necessary seismic data for the analysis.

In the development of these studies of the microseisms induced behavior we presented at the International Meeting in San Diego in 2000 the data of significant increase in the stress state of the medium at the territories placed on 1000 km, 3000 km and 5000 km distances from military operations during the second Iraqi and Yugoslav wars [20, 21].

The framework to the development of ideas about new theory of Global Warming served the study of the processes in earthquakes sources of on the basis of experimental data on the distribution of intensities of microseisms on the Earth's surface in seismic and non-seismic areas.

They led to the conclusion that the earthquake source mechanism is acting to an energy pump, constantly absorbing energy from the medium (the Earth), and thereby increasing its intrinsic energy. More energy is absorbed by the earthquake source and less released to the ambient medium. A self-sustained oscillation system is created between the earthquake source and the energy field of the Earth, which eventually results in the earthquake's main shock. (First presented at ESC, XVIII General Assembly, Moscow, Oct. 1984) [27].

According the results of our studies the earthquake source does not need the same scale of energy to be activated as released during an earthquake. We have been shown that a trigger effect is enough to change the balance of energy exchange between seismic source and its ambient medium.

Background to new theory on Global Warming: “seismic gap”-like behavior of dynamic zones in Earth media.

Behavior of any stressed earth medium has the same pattern. Analysis of microseisms behavior and the levels of intensities above and outside the earthquakes zones have been done. Disposing the previous assumptions levels of background microseisms noises are higher in the so-called quiet non-active regions in comparison with active ones by several times!

This was proven by monitoring of seismic noise in many dynamic and non-dynamic zones. Tables 1 and 2.

The intensity of microseisms noise at the earth's surface above the source reduces constantly during this period, explaining the observed decrease in pre-earthquake background seismic noises – so called “the seismic gap” [8]. Thus, the study of the physical processes occurring in the earthquakes sources, led finally to the understanding what in fact is the basis of environmental problems and warming the planet [1, 2, 3, 4, 6, 7, 9].

The similarities between the mechanisms of the earthquake source and the Earth's medium developments lead to the conclusion that induced disturbance of energy exchange between the Earth and its containing environment, - space, with increased absorption of energy is the main cause of increased problems of the planet excitation [5].

Uncontrolled human impact over many years has resulted in constant increase of the Earth's energy state, its natural stability and sensitivity. More energy absorbed by the Earth, with decrease in energy released to Space: these effects are expanding, covering larger and larger areas, regions and entire continents.

Excitation of the Earth and Global Warming

Our planet has come to such a state of excitation that even relatively minor impacts at one location can cause destructive effects far away and within all of the natural spheres. The Earth excitation system have already come to self-sustained oscillation phase with increased absorption of energy which is the main cause of increased temperatures on the planet (Global Warming) and associated ecological problems.

The conclusions made about the actual physical nature of environmental problems were then successfully confirmed by the result of analysis conducted about earthquakes of the twentieth century. On the basis of data about the catastrophic and the strongest earthquakes (considered events with a magnitude M equal to 8 or more) the average annual levels on the planet of seismic emission energy have studied. Such an approach is statistically reliable. Since the energy of a similar event thousands of times greater than the energy of the most frequently occur on the planet earthquakes with much smaller magnitudes. On the other hand, it is

Table 1. The levels of the microseisms intensities on the Earth surface in dynamic zones.

№	Period of registration	Background level of microseisms (dB)	Place of registrations	
			Regions	Country
Seismic zones				
1	16.07.77-02.09.77	6-18	Kulyab, Pamir,	Tajikistan
2	06.06.80-17.07.80	12-24	Siazan,	Azerbaijan
3	15.07.80-23.09.80	12-18	Ismailly,	Azerbaijan
4	14.05.81-10.09.81	12-18	Ismailly,	Azerbaijan
5	14.05.81-10.09.81	18	Shemakha,	Azerbaijan
6	14.05.81-10.09.81	15	Padar,	Azerbaijan
7	14.05.81-10.09.81	18	Tirdjan,	Azerbaijan
8	14.05.81-10.09.81	18	Pirkuli,	Azerbaijan
9	01.12.81-15.01.82	6-12	Ismailly,	Azerbaijan
10	14.04.86-27.05.86	3-6	Bishkek,	Kyrgyzstan
11	04.05.86-29.07.86	6-12	Tiksi, Saha-Yakutia,	Russia
12	14.06.87-30.09.87	6-9	Pap,	Uzbekistan
13	10.06.88-20.08.88	6-9	Batken,	Tajikistan
14	01.10.88-15.10.88	3-6	Osh,	Kyrgyzstan
15	12.06.89-25.08.89	3-6	Mukachevo,	Ukraine
16	26.06.91-09.10.91	6-9	Feodosya,	Ukraine
17	20.09.93-30.11.93	6-12	Tebriz,	Iran
18	10.02.00-12.05.00	12-18	Saatli,	Azerbaijan
19	01.03.02-12.10.04	18	Shemakha,	Azerbaijan

Table 2. The levels of the microseisms intensities on the Earth surface in non-dynamic zones.

№	Period of registration	Background level of microseisms (dB)	Place of registrations	
			Regions	Country
Aseismic zones				
1	09.06.77-19.10.77	24-30	Ganja,	Azerbaijan
2	21.10.77-25.12.77	30-36	Kuba,	Azerbaijan
3	15.11.77-25.11.77	36-42	Yalama,	Azerbaijan
4	09.09.78-13.12.78	24-36	Samur,	Azerbaijan
5	01.02.79-25.05.79	24-36	Gyadik,	Azerbaijan
6	25.08.79-22.11.79	24-42	Rechitsya,	Belarusian
7	12.11.79-24.12.79	30-36	Gobystan,	Azerbaijan
8	15.11.80-25.11.80	24-36	Gendob,	Azerbaijan
9	10.06.82-25.12.82	24-36	Gobustan,	Azerbaijan
10	10.06.82-20.12.82	36-48	Atbulag,	Azerbaijan
11	08.07.83-30.12.83	30-36	Gendob,	Azerbaijan
12	24.12.83-27.04.84	36-48	Atbulag,	Azerbaijan
13	05.05.85-15.10.85	30-42	Navagi,	Azerbaijan
14	10.01.83-15.08.86	30-36	Gendob,	Azerbaijan
15	29.05.84-20.09.86	18-24	Divichi,	Azerbaijan
16	10.11.84-15.12.87	30-42	Lokbatan,	Azerbaijan
17	29.05.86-26.02.92	36-42	Gendob; Apsheron,	Azerbaijan
18	25.02.87-15.02.94	36-48	Binagadi,	Azerbaijan
19	01.03.94-20.09.95	30-33	Nabran,	Azerbaijan
20	01.09.95-30.09.96	30-36	Apsheron,	Azerbaijan
21	20.10.96-30.05.05	21-30	Elabuga, Tatarstan,	Russia
22	10.09.99-10.02.04	24-30	Mingchevir,	Azerbaijan
23	10.10.99-15.03.05	28-33	Haldan,	Azerbaijan

possible to say that the preparation (deformation) areas of these earthquakes are quite comparable to the surfaces of some planet's regions.

The Diagram 1a presented in 2008 demonstrated as dramatically was increased the intensities of the seismic emissions (for $M \geq 8.0$) and their strong fluctuations at different periods of time in the second half of the century.

Thus, in comparison with the background level in previous period, 1900 – 1945, after the start of nuclear explosions they increased by 12 times. Then when countries agreed to decrease the explosions power the levels of released seismic energy decreased also but up to 2008 still to be 3 - 4 times higher than they were in the period from 1900 to 1945.

These surprising and unusual results prompted the idea to analyze the course of changes of deep-focus earthquakes, which led to even more unexpected results. It turned out that for the depth ranges (100 km - 400 km) and (400 km or more) the number of earthquakes in the second half of the twentieth century has multiplied! The Diagrams 2a, 3a.

However for last 5 years, 2008 – 2014, these changes became more dramatic, demonstrated significant increase of the energy of seismic emission and number of deep-focus earthquakes. The Diagrams 1b, 2b, 3b present the complex of previous (1900-2008) and current data.

When preparing data for Oslo the similar sharp increase in the number of deep-focus earthquakes was detected only from the period when the world moved on underground nuclear explosions, UNE, in the 60s. But they are more than 20 years, since 1992, as stopped, and after their termination the level of seismic emission dropped significantly, although continued to be kept sufficiently high.

However in the last 5 years it has experienced inexplicable tremendous growth in the complete absence of comparable with nuclear explosive impacts on the environment! Seismic radiation intensity on a global scale has increased within 5 years by 3-4 times, and in relation to the background level (1900-1945) to 11 times (!!!). At the same time as a sharp increase in the number of deep-focus earthquakes: it has grown from 8 to 15 times! This can, unfortunately, mean something very unfavorable, requiring urgent joint activities!

Note that in Oslo was presented also a diagram of energy changes of seismic emission for $M \geq 8.5$, which for the last five years have experienced growth but not as sharp as for $M \geq 8.0$ and therefore these data are not presented in this paper.

It became clear that the results obtained by our studies to date concerning the annual average energy level of the seismic emission on the planet confirmed in the most convincing way the conclusions we have made earlier and to which we came in 2008. We may summarize that environmental degradation do not associated with the dominant role of CO₂ on atmospheric changes on the planet, as ecologists argue, referring to the increase in its concentration. This pushed us to the earlier position about the energy changes in the planet's body and the further deterioration of the environment, causing increased number and intensities of the natural disasters. The obtained results not only confirmed the proposed by us model of climate change, but gave impetus to a new understanding of the process.

It is important to note that although we have considered the average annual change in the energy levels of seismic emission and the number of deep-focus earthquakes in the past five years, but even during these years there has been a considerable increase in both parameters.

Abnormalities in Earth-Space Interaction

Similarities between the Earth excitation mechanism and development of the earthquake source lead to the conclusion that changes in the Earth's energetic balance should make, in its turn, significant impact on the surround environment – the Space. This phenomenon is reflected by vast number of abnormalities not only in the all Earth spheres but also in many space abnormalities which have been observed in last several decades.

The strongest earthquakes in the 20th century ($M \geq 8,0$)

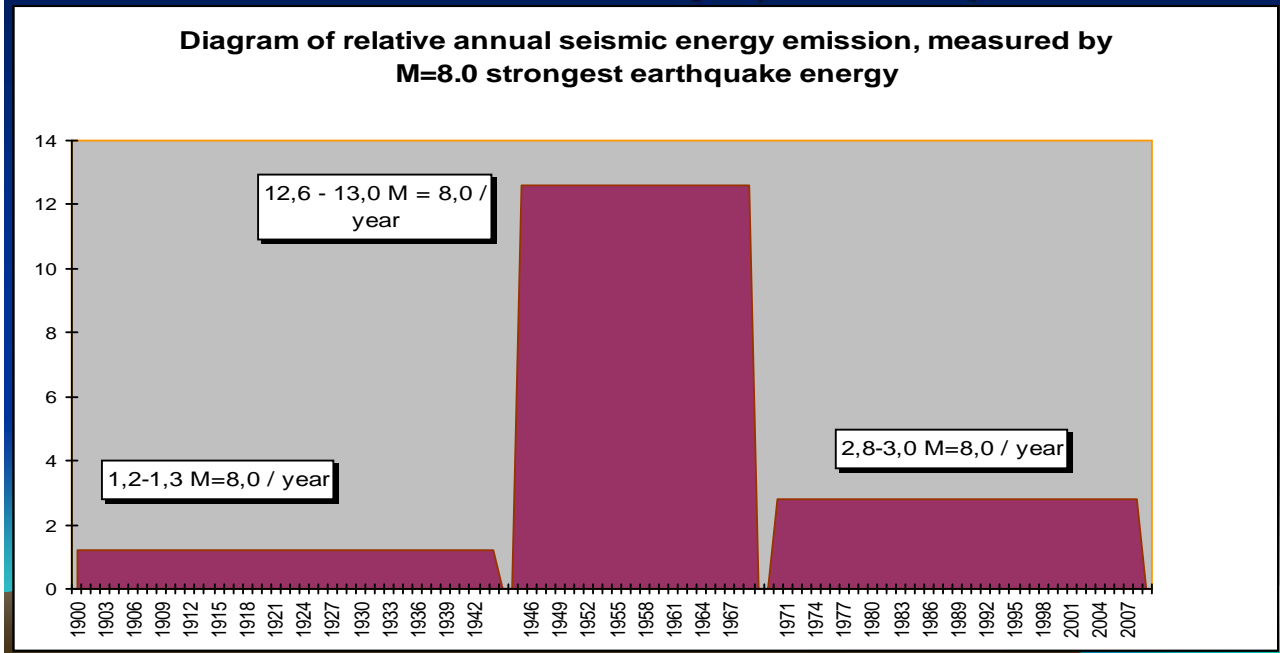


Figure 1a

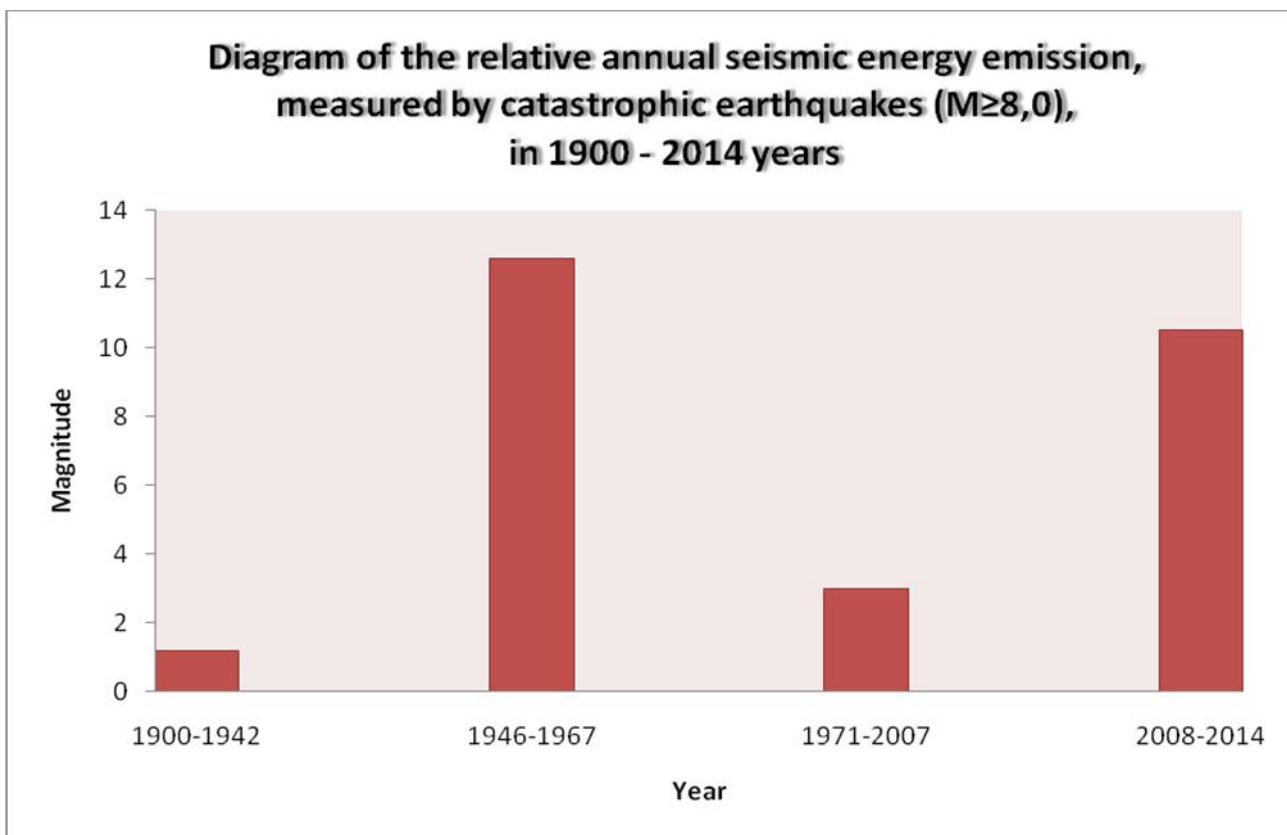


Figure 1b

The deep-focused ($H \geq 100\text{km}$) strong earthquakes ($M = 6.0-7.9$) in the 20th century

Diagram of relative number of annual seismic events in comparison with $M=6.0$ earthquakes

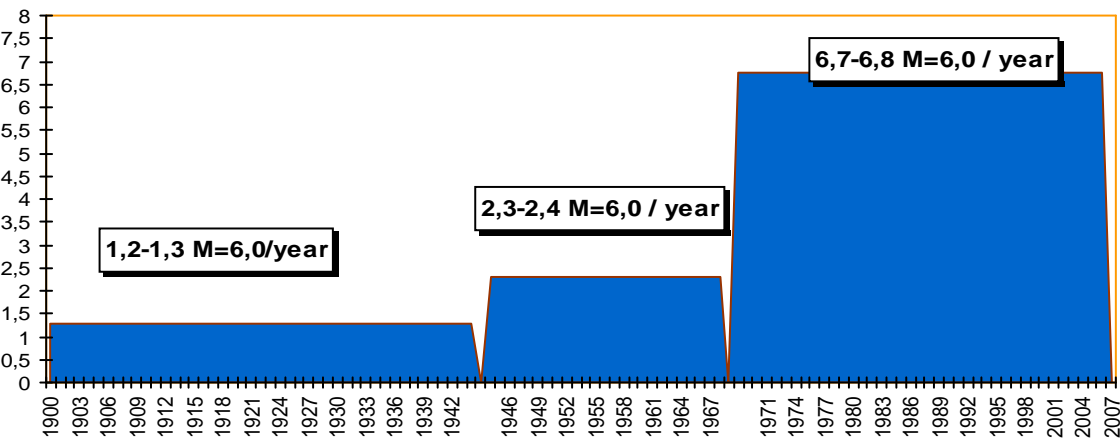


Figure 2a

Diagram of the relative number of annual deep-focused ($H=100-400\text{km}$) earthquakes ($M = 6.0-7.9$), in 1900 - 2014 years

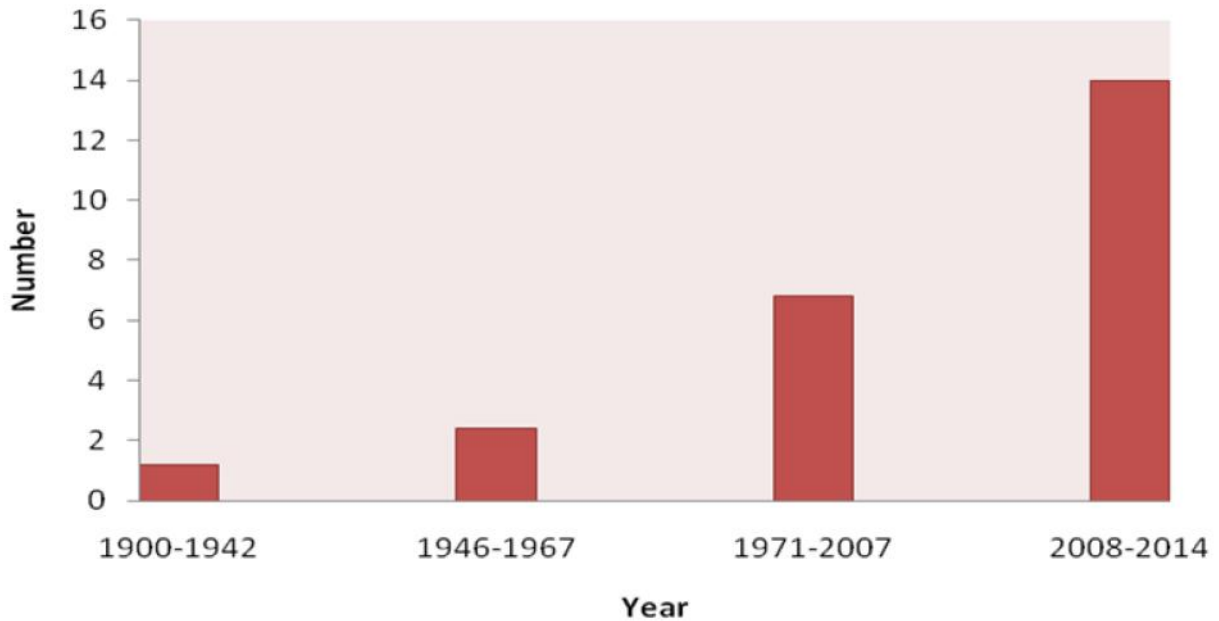


Figure 2b

The deepest ($H \geq 400\text{km}$) strong earthquakes ($M = 6.0-7.9$) in the 20th century

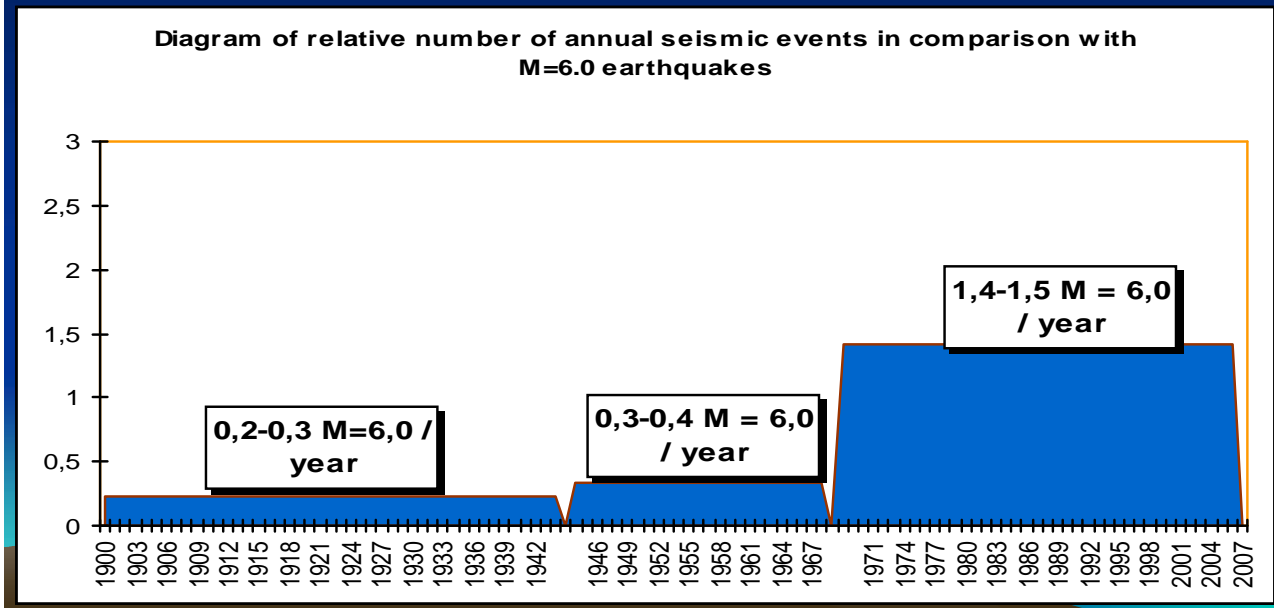


Figure 3a

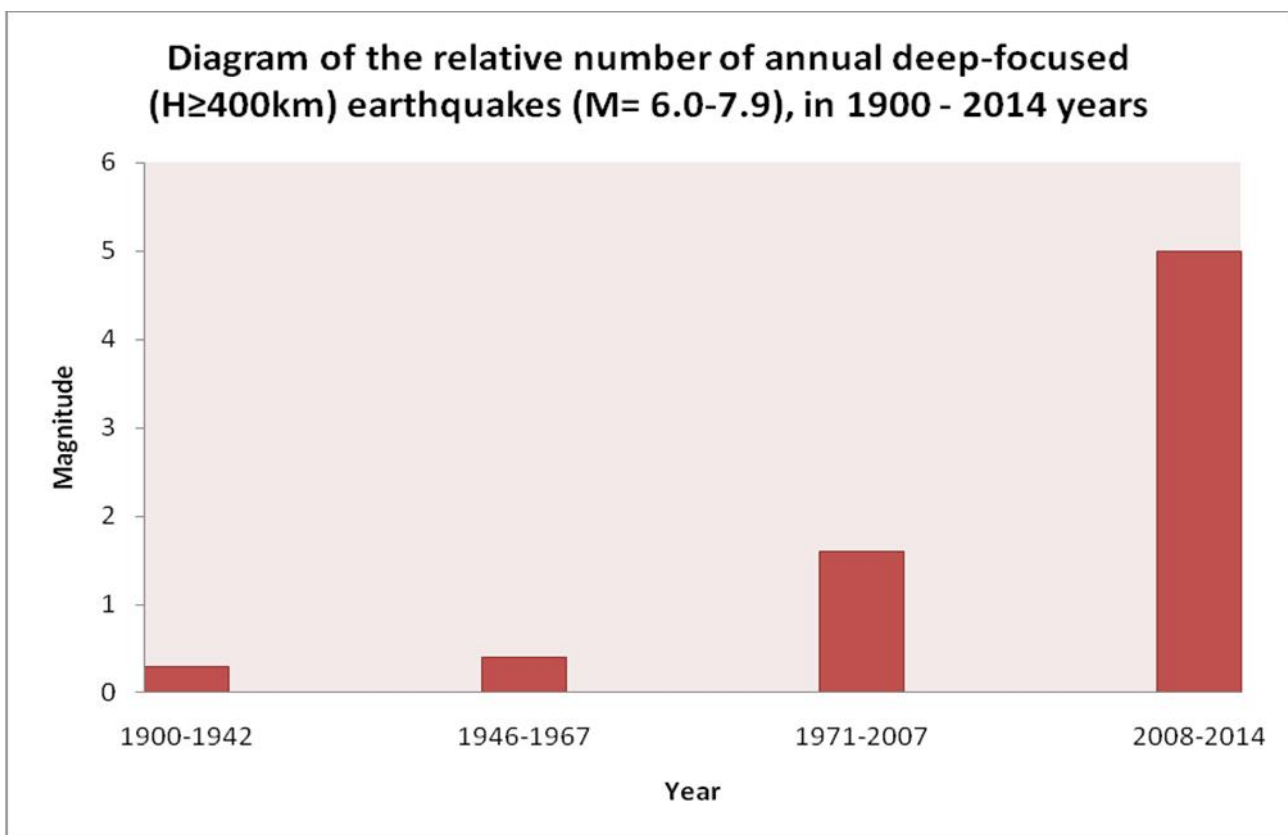


Figure 3b

Conclusions: Global Geophysical Monitoring and Intervention System

In 2008: “**Key point**: holistic view on induced disturbance of energy exchange between the Earth and its containing environment: the Earth excitation with increased absorption of the energy is the main cause of the Climate Changes and increased temperature on the planet.

We propose:

- The creation of a Geophysical Monitoring and Intervention System.
- To monitor geophysical conditions across the globe.
- To detect critically disturbed areas.
- To conduct procedures for reduction of these disturbances and restoration of natural interactions. “

In 2014: Today, many countries have already concluded about the imperfection and incompleteness of the existing hypothesis of environmental changes and propose to prepare by 2015 a new global environmental program. We expect that our results, conclusions and suggestions will be reflected in this new program.

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