International Journal of Geology, Earth & Environmental Sciences ISSN: 2277-2081
An Open Access, Online International Journal Available at http://www.cibtech.org/jgee.htm
2020 Vol. 10(2) May-August, pp.103-107/Khusomiddinov et al.
Research Article

THE INCREASING INTENSIFICATION EVENT OF THE TIDAL DEFORMATION IN THE EARTHQUAKE PREPARING AREA

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ABSTRACT
The presence of tidal components in variations of gas, component and physical parameters of groundwater revealed In periods and areas of strong eathquake installed their intensification.

Keywords: *Earthquake, Intensification, Tidal Deformation, Spectrum of Variation, Seismic Hazard Prediction, Stress of The Earth Crust, the Variation of Parameters in Groundwater*

INTRODUCTION
The earthquake prediction issue is comparatively young field of geophysics. Despite the great importance, the purposeful task developing scientific base and the earthquake prediction methodology the first had delivered in 1966 while establishing the Institute of Seismology of the Academy of Sciences the Republic of Uzbekistan. At the stages of complex studies in Uzbekistan as well as a number of other countries discovered previously unknown phenomena of nature, preceding earthquakes (Chernyavskiy, 1925; Barsukov, 1973; Mavlyanov *et al.,* 1966; Husomiddinov, 1997; and Mavlyanov *et al.,* 1979) and were developed a number of qualitative earthquake prediction models (Sobolev, 1993; Scholz C.H., Sykes, 1973; and Dobrovolskiy,1991). The researches had brought significant contribution to the fundamental base of earthquake prediction methodology and moreover served to create the base of experimental-methodological polygon monitoring its precursors. Despite the obvious achievements the reliability of the earthquake prediction assessment has not yet answered the practical requirement of the social importance. This situation requires the further research of sources and the mechanism of seismogenic processes.

MATERIALS AND METHODS
In the known models of the earthquakes preparation as seismogenic sources have been examined alone endogenous processes, but outward atmospheric or gravitational effects are not took into account which will be restrict their opportunities. At the latest years Bokov and Sitinskiy (2002) had worked out the earthquake short-term prediction methodology based on monitoring of gradient atmospheric flows, which is apparently associated with their trigger effect on the seismogenic processes.
In this paper is presented the results of researches of the role of tidal factors in the process of preparing earthquake caused by the gravitational action of the Moon and the Sun. For the periods of manifestation they are divided into semidiurnal, diurnal, two-week, monthly and long-term periods of 0, 5 years (Panteleev, 2001).
The researches had included the comparative analysis of a number of strong seismicity and a number of the dynamics of tidal component of the variations of gas, component and physical parameters of the underground water. In a sample of earthquakes including events, which capable of creating at the observation point of anomalous relative deformations exceeding the amplitude of background values of relative to tidal deformations of more than 10-8. Taking into account the limited statistics of strong earthquakes, the period of 1980 - 1990 was chosen for testing the proposed methodology, which is characterized by the greatest activation of strong seismicity.
In the model presentation, the fluid environment of the earth's crust is the most dynamic and can serve as informative indicator of stress-strain state of layers of the earth's crust. Periodic alternative effects of gravitational wave are capable of call relevant deformation of mountainous massifs which might show

also in the variation parameters of underground water. It should be expected that the intensification of tidal deformations will increase the volumes of defective structures of mountainous massifs (fractures zones, faulty dislocations, and occurred earthquakes sources) by 1-2 orders of magnitude than in integral intra-block structures. The earthquake prediction process is several years depending on its energy and accompanied by several qualitative stages of anomalous deformations of a particular consolidated volume of the earth's crust under the influences of tectonic stresses. This process accompanied by quantitative-qualitative development of cracking processes and ends with a main rupture- earthquake. Here, by reaction of underground water to the influence of gravitational source, provides an opportunity to track development of seismic processes in the field of earthquakes preparation and its possible precursor.

Spectral analyses of background daily variations in underground water parameters showed in the presence in their structure of components with periods two or four weeks, which are caused by tide-generating potential of the Moon. They are manifested with varying intensity in almost all analyzed parameters of underground water. As an example, figure 1 shows power spectrum of variation of CO2 in the down hole 'Namangan', which confirms the presence of half-monthly and monthly the lunar tidal composing in variations of the underground water.

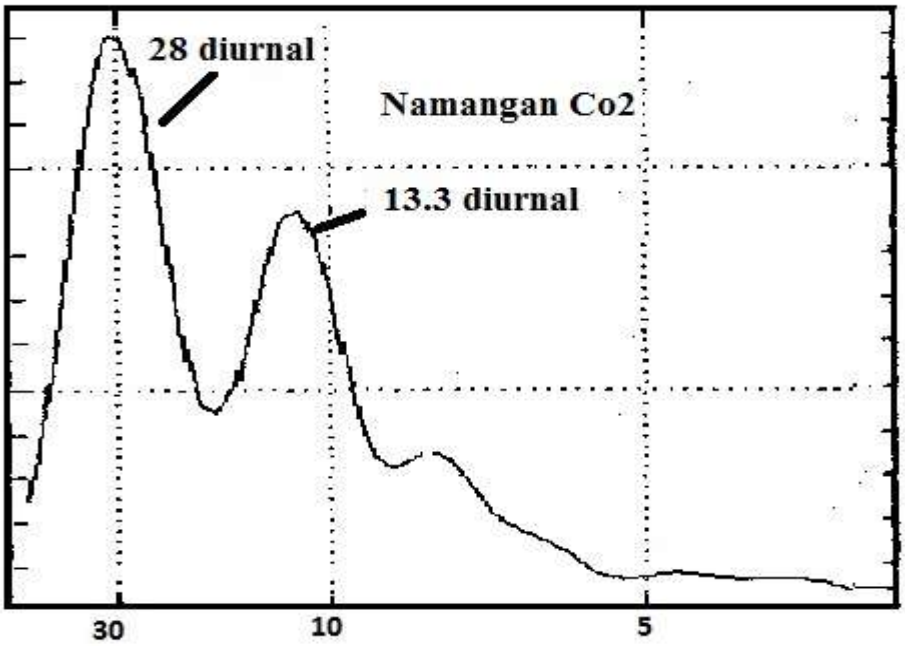

Figure 1: Spectrum power of variations of carbon dioxide in the Namangan well.

In order to study of peculiarities of the tidal factor in the preparation processes of earthquakes made comparative analyses of dynamics of the tidal components of the variations analyzable parameters of the underground with the strong earthquakes on the activated territory of Eastern Uzbekistan. In figure 2 shows the arrangement of the down holes being analyzed, epicenters of occurred earthquakes and the main tectonic structures of the region.

Analyses of the dynamic of the tidal radon (Rn) component in the 'Fazilov' down hole (the region of Tashkent) showed two intervals of its intensification in 1982 and in 1985, the maxima of which coincided with the Chimyanian earthquake, 1982, with energy $E=10^{13,8}$ Dg. and Kayrakumsian earthquakes, 1985, with energy

$E=10^{14,6}$ Dg. Epicenter distance to these earthquakes is respectively 190 km and 110km. The analyzed observation points are within the theoretical estimated area of preparation of these earthquakes the radiuses of which $R=e^{M}$ km [8] respectively are 137 and 240 km, where 'M' is magnitude, 'e' is base of natural logarithm. In the analyzed interval of seismic activation within this zone observed also Papsian

earthquakes ditch with the main underground shock on February 17, 1984, with M=5.5. It was not accompanied by anomalous tidal variations, which is apparently due to the predominance of the horizontal component of the tectonic stress vector.

Characteristic differences the dynamics of the tidal variations of Rn in the 'Namangan' down hole during the Kayrakumsian earthquakes is the manifestation of its maximum after the underground shock. This feature is perhaps due to numerous aftershocks and the sensitivity of the observation zone and its relatively short remoteness from the epicenter.

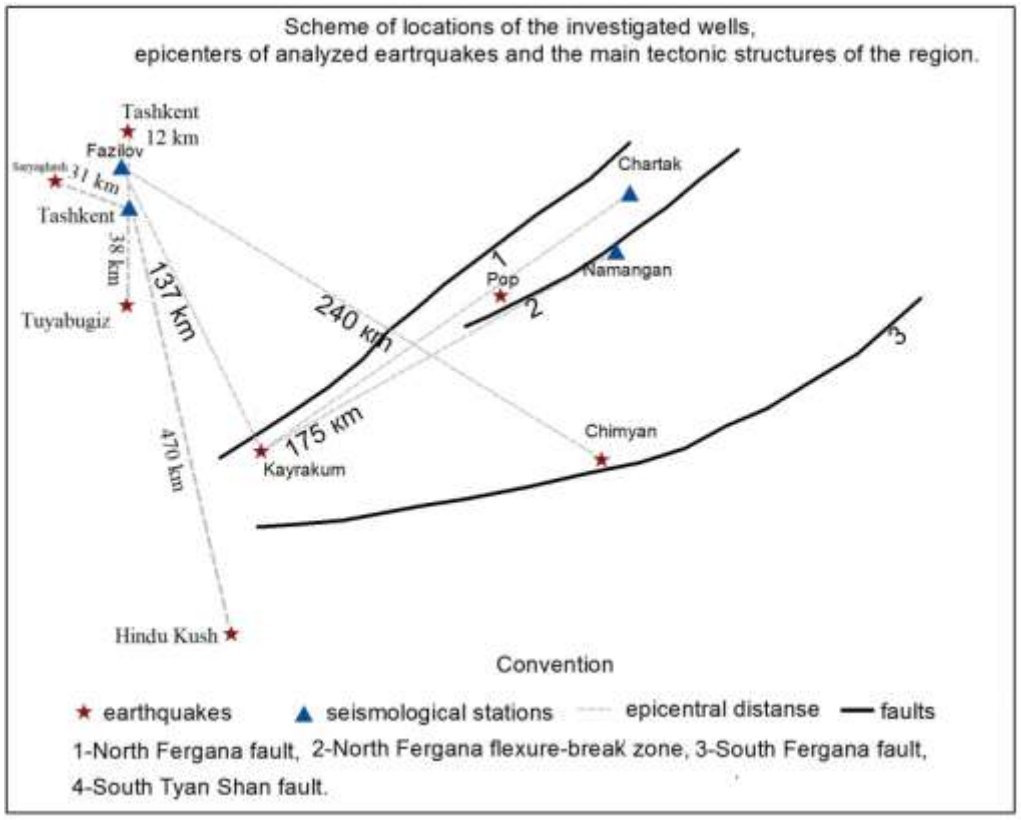

Figure 2: Scheme of location of wells and epicenters of earthquakes.

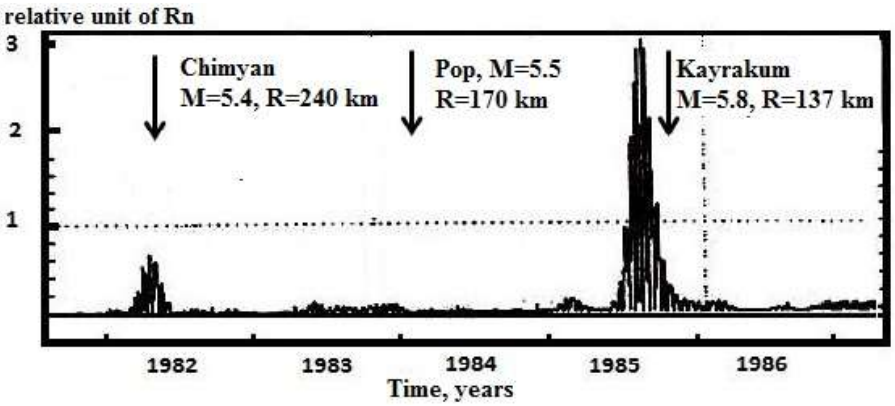

Figure 3: Variations of the tidal radon component – Rn in the Fazilov well, here and further the moment of the earthquake.

RESULTS AND DISCUSSION

In the analyzed examples was analyzed the features of the manifestation of tidal variations in underground water with a period of four weeks, which are due to tidal-formative potential of the Moon. They showed the presence of anomalous amplification effects of the amplitudes of tidal waves in the area and the time earthquakes preparation, which are evidently due to deformation processes.

The second potential with a tide-generating source is the sun. Its long-period component due to change in the declination was lighted and composed six months. Figure 4 was showed the dynamics of this component in the years 1980-1987 in the variations of Rn in the 'Chartak' borehole. On this interval is observed one anomaly of the solar tide, at the decline of which occurred the closest and strong Kayrakumsian earthquake in 1985. As is obvious the long-period component, due to tide-generating potential of the Sun is also present in variations of underground water parameters and manifests itself several years before the underground shock.

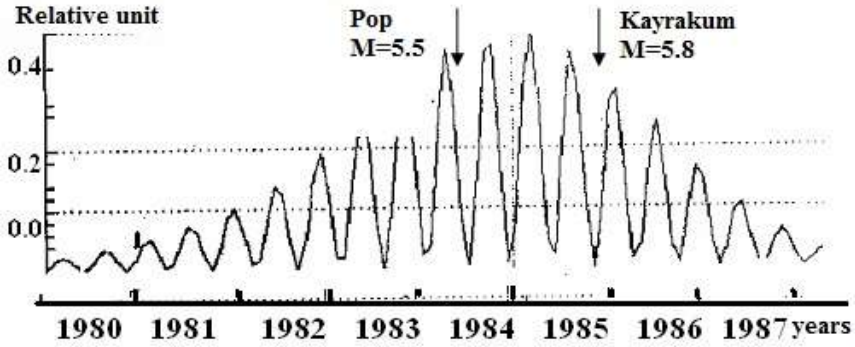

Figure 4: Dynamics of long-period tidal variations Rn in the Namangan well.

The examined examples and further studies in other seismogenic zones showed a regular manifestation of anomalous intensification of tidal deformations in all areas and periods of earthquakes preparation.

The considered examples and further researches in other seismogenic zones have shown natural manifestation of abnormal intensification of tidal deformations in all areas and periods of earthquake preparation. Below in Figures 5, as an example is given a similar reaction of CO2 in a well ... located in the Tashkent reg city.

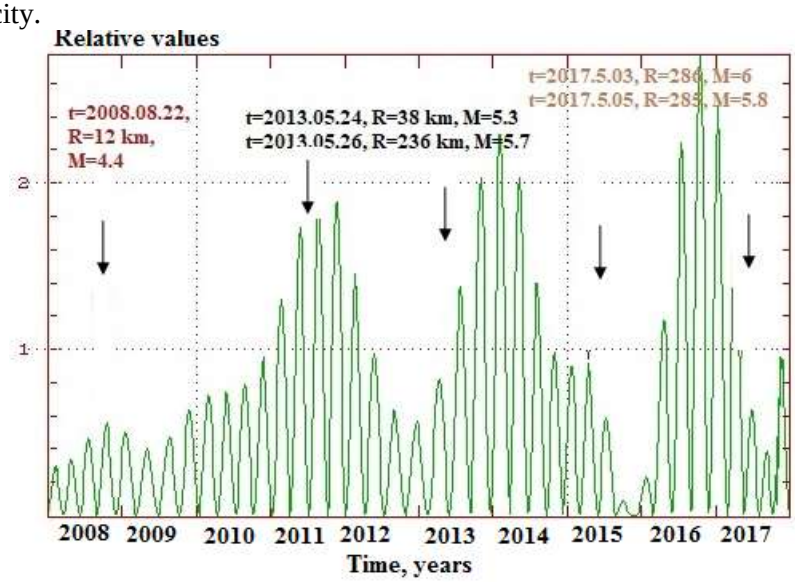

Figure 5: Semiannual tidal variations of groundwater CO2 at well in Tashkent city

Conclusion

It is necessary to note the summarizing results of the studies:

As a result of conducted studies experimentally established an unknown phenomenon of the nature of the intensification of tidal-deformation process in the area and time of preparation of strong earthquakes, which are evident in the variations of the underground water parameters.

The revealed effects are highly informative control tool of stress-strain state of the earth's crust, dynamics of seismogenic processes, identify critical areas and periods of seismic activity.

Probable mechanisms of this phenomenon might be cracking process, redistribution of tectonic stresses due to differences in the density properties of the constituent mountain massifs and other factors that require further research.

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