

# Influence of electromagnetic fields and explosions on seismicity, geodynamic effect

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Earlier, the authors showed that the irradiation of the crust of the Garm area of Tajikistan with high energy electromagnetic pulses (EP) caused noticeable increase in seismicity. In addition to the EP, Semipalatinsk underground nuclear explosions (NE) had a triggering effect on the seismicity of this area. We considered of their combined effects. First, changes in seismicity of this area after NE was studied only during the period of conducting experiments on irradiation of the crust. It is shown that impacts of NE, as well as EP, causes statistically significant increase in seismicity and significant increase in TSE. However, the irradiation of the crust causes stronger increase of seismic activity than the NE. It has been found that irradiation of the crust in front of NE increases of their trigger effect, whereas explosions made before irradiation reduce the effect of exposure to EP. Two areas were identified on the map in which an abnormal increase in TSE occurred after irradiation and explosions. One of them was confined to the active Darvaz-Karakul fault, dividing Tajik Depression and Darvaz range, and the other to a minor fracture in the northern part of the depression. Both of them have a complex configuration in the form of two "petals" located on different sides of these faults. In both cases, one of "petals" appears after the EP, and the second - after the NE. "Petals" did not intersect in depth. After EP, strong increase in TSE occurred in the subsurface (0-5 km) layer, and after NE at depths of more than 5 km, i.e. EP and NE cause the activation in different geological structures.

Apparently, each of these «butterflies» is a single anomalous region, various parts of which are activated by the influence of particular physical nature. Previously it was shown that the strongest activation of seismicity after irradiation of the crust is observed in areas of high tectonic stresses. Consequently, the strongest seismicity enhancement after NE also occurs in areas of increased stress. The trigger effect of NE was studied also at the same intervals before and after the completion of these experiments. It turned out that before and after them such anomalous areas were not observed. Consequently, their occurrence is more associated with stress concentration, possibly with the preparation of strong earthquakes. However, no strong events occurred in these areas, which may be due to the relaxation of elastic stresses caused by irradiation of the crust. When these experiments were completed, no areas of anomalous stresses were observed at all within a radius of  $\sim 60$  km from the irradiation source. Consequently, irradiation of the crust led to their relaxation over a wide area of  $\sim 3500$  km<sup>2</sup>, but judging by the significant increasing of seismicity caused by NE, in the southwestern and eastern southeastern margins, this led to an increase in stress at the periphery of the irradiated area.