Solar activity and trigger effects in seismoactive Earth areas

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The effect of magnetic storms with sudden Storm Commencements (SSC) on the global seismicity of the Earth has been studied. To recognize the induced changes in seismicity against the background, the overlay epoch technique was used. The averaged dependence of number of earthquakes on time within time windows of ±30 days from the SSC was obtained. It is shown that after SSC there is statistically significant decrease in number of earthquakes by 2%, and after 5-6 days their number begins to increase again. Interestingly that attenuation of seismicity began 2-3 days before the SSC. Consequently, storms could not be its cause.

It can be assumed that changes in seismicity causes ionizing electromagnetic radiation (ERS) of solar flares (SF), which reaches the Earth in just 8.2 minutes. To verify it, the change in seismicity was studied before and after sharp bursts of ERS power had studied, using the same method. It turned out that after them on Earth there is a sharp statistically significant decrease in the number of earthquakes, which exactly coincides with them in time. Immediately after the bursts, the number of earthquakes drops by 5% and then begins to gradually increase.

This can be explained by the fact that the Earth's crust is constantly irradiated by electromagnetic waves generated by near-equatorial thunderstorm activity. Such irradiation stimulates the magnetoplasticity of the rockst, accelerates the relaxation of elastic stresses and causes their redistribution. This, in turn, has a trigger effect on weak and moderate seismicity. The deterioration of conditions of propagation of electromagnetic waves, caused first by the ionizing radiation SF, and then by magnetic storms, reduces the intensity of the electromagnetic fields generated by thunderstorm and slows down this process, which reduces the seismic activity.

It is in good agreement with the results of the author's work, in which it was found that the artificial irradiation of the Earth's crust of the Garm region of Tajikistan with high energy electromagnetic pulses (EP) caused a noticeable activation of weak earthquakes. In addition to the EP, Semipalatinsk nuclear explosions (NE) had triggering effect on seismicity of this region. It was found that irradiation of the EP before NE increases their trigger effect.

In this connection, the effect of NE on the seismicity of this area was studied from two selection. Only those explosions were included in one of them, during ±30 days before and after which there were sharp increases in the ERS intensity, and the other included NE before and after which no such events were recorded. It turned out that in the first case (at low intensity of electromagnetic fields generated by thunderstorm activity) the number of earthquakes increases by 2 times. Moreover, this change is not statistically significant. And in the second (at its high intensity), a statistically highly significant increase in the number of earthquakes was observed by 10%. This confirms the assumption that a decrease in seismic activity after SF results in a decrease in intensity of electromagnetic fields generated by thunderstorm activity.