

# The distribution of seismic activity of multi-level geosystems across the phases of the solar cycle

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In recent decades, the question of the possible connection between the seismicity of the Earth and the 11-year cycle of solar activity has been intensively studied. But there are supporters of the opinion and the absence of such a connection. There is no unity in the question of the distribution of manifestations of seismic activity across the phases of the solar cycle. Apparently, these differences are caused by different methods of calculation and the use of data for different regions and periods of time. This paper shows the difference in the distribution of seismic activity for the whole world, hemispheres, sectors, latitudinal belts and individual regions in phases of the 11-year solar cycle. The epoch superposition method was used. The characteristics of seismic activity were considered series of the number of earthquakes and the total released seismic energy. To characterize the solar activity, Wolf numbers for the period from 1964 to 2018 were used. The phases of the solar cycle, which account for the maximums of the number of earthquakes or released seismic energy, have been identified for all the territories examined. The phases identified in this way differ for the world as a whole (the seventh year of the solar cycle) and for individual hemispheres. At the same time, the results of the northern and eastern hemispheres practically coincide with the global ones, whereas in the southern and western hemispheres the maxima of seismic activity occur earlier. A pattern was found in the distribution of seismic activity across the latitudinal belts of the northern hemisphere: the phases of the onset of the main maximum increase with increasing latitude and this pattern is expressed by a power function. At the same time, for individual regions, the results may be unstable to a change in the sample of the events under consideration (all earthquakes are taken into account or only strong ones) and differ from the results for the world and individual hemispheres. Such a motley picture is explained by the fact that the observed distribution of seismic activity is the result of a multitude of impacts of different nature, in which it is difficult to isolate the influence of a specific factor. It is assumed that the correlation of solar activity with the seismic activity of the Earth is explained by a common cause affecting both of these processes, namely, the disturbing effect of the Sun's rotation around the solar energy barycenter. The observed asymmetry of the hemispheres may be explained by the displacement of the Earth's core from its geometric center to the northeast, discovered in the 1990s. Undoubtedly, further studies of solar-terrestrial relations should be aimed at clarifying the physical mechanisms of both external influences and the characteristics of ground-based responses, and be interdisciplinary in nature.