The uncertainty principle of the prediction of the three parameters of the earthquake

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As you know, energy processes in the microworld are probabilistic in nature and limited to the fundamental concept of quantum mechanics - the presence of Heisenberg uncertainty. For a long time it was believed that processes in the macrocosm are deterministic and the uncertainty relation does not apply to them. However, in accordance with the requirements and the study of dynamically unstable macrosystems, there are more and more facts testifying to the possibility of applying uncertainties to describe the behavior and some classes of macrosystems.

In particular, the energy processes in seismic foci are nonlinear. The success of various short-term earthquake prediction techniques only from seismic catalogs, in our opinion, is also limited to some analogue of the Heisenberg uncertainty principle. Therefore, using only seismological information, it is impossible to reliably determine (predict) three parameters at once – the magnitude, time and place (epicenter position) of an earthquake.

The practice of predicting earthquakes in Kamchatka, Sakhalin and in the Altai-Sayan region in 2008-2018. suggests that a short-term (with an accuracy of ±1-3 days, M ± 0.5) forecast is possible, but the position of the epicenter increases to ± 300-500 km. Conversely, with a successful prediction of the position of the epicenter (with an accuracy of ± 50-100 km), the error in time can reach ± 10-15 days, and in magnitude ± 1.0-1.5. To overcome the fundamental impossibility of a successful forecast at the same time in three parameters (magnitude, time, place), it is necessary to use the complementarity principle, which is developed in quantum mechanics.

With regard to the practice of forecasting, it is necessary to use a complex of various methods. In particular, to predict the position of the earthquake epicenter, it is advisable to use infrared, electromagnetic, infrasonic radiation, gas emission in the zones of seismic foci during the preparation of earthquakes by monitoring the above parameters using satellites.