

## Deviation from the Omori law as the result of the trigger impact of round-the-world surface seismic waves on the source of strong earthquakes

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In recent works we have discovered and described new previously unknown patterns in the dynamics of the aftershock flow (Guglielmi, Zotov, 2013; Guglielmi, Zotov, Zavyalov, 2014; Guglielmi, Zavyalov, Zotov, Lavrov, 2017). One of these is that the strongest aftershock of a strong earthquake can be induced by a surface seismic wave that made a revolution around the Earth and returned to the epicentral zone of the main shock after about 3 hours. We called this phenomenon «the round-the-world seismic echo effect». In the author's opinion, the physical nature of this phenomenon consists in the fact that superposition leads to a concentration of wave energy when the convergent surface waves reach the epicentral zone (cumulative effect). The effect of the first seismic echo is most clearly manifested. In this case, in the vicinity of 3 hours relative to the time of the main shock, a statistically significant deviation of the aftershock process from the hyperbolic Omori law (Zotov, Zavyalov, Guglielmi, Lavrov, 2018) is observed. To explain this on the basis of a formal analogy between the attenuation of aftershock activity in the lithosphere and the recombination of charged particles in the ionosphere a differential equation of aftershocks is proposed (Guglielmi, Zavyalov, 2018). The general solution of the equation preserves the hyperbolic structure of the Omori law but at the same time makes it possible to flexibly model non-stationarity of rocks in the earthquake source that "cools down" after the main shock. The general solution also makes it possible to take into account the non-monotonic dependence of aftershock frequency decrease in time that arises under impact on the earthquake source of endogenous and exogenous triggers. This presentation is devoted to a detailed statistical analysis of the effect of the round-the-world seismic echo based on the data of the global and regional catalogs over a long period of instrumental seismological observations.

The detected phenomenon of a round-the-world seismic echo is not only interesting from a purely scientific point of view. It can be used to increase the probability of forecasting a repeated strong shock in determining the scenario of the development of the seismic process in the epicentral zone of the strong earthquake that occurred. Based on our analysis, we can state that there is a noticeable probability of a strong repetitive shock about 3 hours after the main shock.

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### References

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