Geosistemy perehodnykh zon = Geosystems of Transition Zones / Геосистемы переходных зон

2025, vol. 9, No. 1, pp. 22–36

URL: http://journal.imgg.ru/archive.htm ; https://elibrary.ru/title_about.asp?id=64191

https://doi.org/10.30730/gtrz.2025.9.1.022-036; https://www.elibrary.ru/wqiuqw

New transition relationships for the energy characteristics of earthquakes in the Sakhalin region

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Abstract PDF ENG PDF RUS Full text PDF RUS

Abstract. Due to methodological changes in the work of the Sakhalin Branch of the Federal Research Center "Geophysical Survey of the Russian Academy of Sciences" (SB FRC GS RAS), it became necessary to clarify the transition relationships between the energy characteristics of earthquakes in the Sakhalin region used for the magnitude unification of the catalog. To obtain the transition relationships, a sample for the period from 2017 to October 2024 was used from the database of the "Yuzhno-Sakhalinsk" regional information processing center, which is a part of the SB FRC GS RAS. Using the generalized orthogonal regression method, the relationships linking the magnitude of crustal (h < 40 km) earthquakes M_L and the energy classes K_P and K_C were calculated, as well as the magnitudes M_L and M_{PVA} separately for crustal and deep-focus (h = 250–600 km) earthquakes in the region. The relationship between M_L and the magnitude of the Japan Meteorological Agency M_j was also obtained. It was revealed that for shallow Sakhalin earthquakes $M_j \approx M_L$; for deep-focus earthquakes, an underestimation of the magnitude M_L relative to M_j was noted. As the observational data accumulates, it is assumed that the obtained relationships will be refined.

Keywords:

earthquake, magnitude scales, regression relationships, Sakhalin region

For citation: *Safonov D.A.* New transition relationships for the energy characteristics of earthquakes in the Sakhalin region. *Geosistemy perehodnykh zon = Geosystems of Transition Zones*, 2025, vol. 9, No. 1, pp. 22–36. (In Russ., abstr. in Engl.). https://doi.org/10.30730/gtrz.2025.9.1.022-036; https://www.elibrary.ru/wqiuqw

***Для цитирования*:** *Сафонов Д.А.* Новые переходные соотношения для энергетических характеристик землетрясений Сахалинского региона. *Геосистемы переходных зон*, 2025, т. 9, № 1, с. 22–36. https://doi.org/10.30730/gtrz.2025.9.1.022-036; https://www.elibrary.ru/wqiuqw

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