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Some features of the morphology of the seismic focal zone of the Kamchatka region

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Abstract. The object of study in this paper is the structure of the seismic focal zone of the Kamchatka region as a part of the Kuril-Kamchatka transitional convergence zone. When studying the morphology of the focal zone, seven layers were distinguished in accordance with the distribution of seismic energy by depth. Based on instrumental observations over 60 years (1962–2021), the maps of earthquake epicenters in the Kamchatka region were constructed for each layer, and seismicity characteristics were obtained: the number of events, depths of peak energy values, total energy, and the ratio of the total energy of earthquakes above class 14 to the total energy of earthquakes from class 10 to 14. Almost half of all seismic energy in the region over 60 years occurred at depths greater than 550 km. Features in the distribution of earthquakes were discovered: their number on the outer slope of the trench (Zenkevich Swell) to the SW of the Avacha Bay is greater than to the NE; in the layer at depths of 80–130 km, the epicenters of earthquakes in the Kamchatka Bay mark an extended lineament, the continuation of which includes the volcanoes of the Klyuchevskaya group and the Tolbachik volcano; the band of earthquakes for depths of 130–180 km and the structure of the volcanic belt overlap. On the vertical projection of the hypocenters of the section of the seismic focal zone to the south of the Shipunsky Peninsula, a steeply dipping fault separating the moving block of the frontal section from the continental lithosphere is distinguished. On the projection of the focal layer section, including the Tolbachik volcano and the Klyuchevskaya group of volcanoes, a vertical fracture was found under the volcanoes at a depth of 140–180 km. Based on the data presented in the article, a hypothesis explaining the morphology of the seismic focal zone not only by the subsidence of the oceanic lithosphere but also by the mantle flow directed to the SE from under the margin of Asia is proposed.

Keywords:

earthquake, Kurile-Kamchatka island arc, morphology of the seismic focal zone, Kamchatka

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