

Geophysical Evidence for the Northern Border of the Okhotsk Plate

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There are a number of microplates in the region of interaction between the Eurasian, North American and Pacific plates. Among them is the Okhotsk plate (OP). However, the location of its boundaries varies depending on the data used by different researchers. The area and configuration of the OP [Okhotsk plate] north of 55° latitude is especially uncertain. Interdisciplinary interpretation incorporating both the newest sea- and land-based gravity and magnetic, seismic (CDP, DSS), seismicity, and geological data allow us to establish the boundaries of the OP based on improved data. Based on these data, the northern boundary of the OP is identified to be within several rift depressions composed of horsts and graben structures. They are separated by long-lived faults, including some that are active today. The north-western boundary trends south toward Sakhalin Island. The location of the northern border coincides with the nearly latitudinally oriented North-Okhotsk depression. The width of North-Okhotsk depression is more than 200 km. Seismically active faults are close to vertical, with amplitudes up to 6-8 km. A number of shelf earthquakes are associated with them. Gravimetric, DSS, and petrologic data from the extrusive volcanics of the Okhotsk-Chukotka volcanic belt allows us to consider that this boundary is a consequence of a paleo-Benioff zone. In this zone, the continental crust is of transitional type. This proposed northern border detaches the Kolyma triangle from the OP as previously proposed. Its geophysical field is similar to adjacent continental localities, and the direction of axes of regional anomalies is discordant to the orientation of the rift zones, along which we establish the borders of the OP.