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Seismotectonic deformations of the crust in the Arctic sector of the border between the Eurasian and North American plates

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The Arctic sector of the Arctic-Asian seismic belt consists in the spreading Gakkel ridge, a continental slope, a system of rift basins in the Laptev Sea shelf and conjugate coast structures. It's one of key regions in our understanding the dynamics of interaction between the Eurasian and North American plates. The Arctic sector is divided into different segments (the Gakkel ridge, Laptev Sea, Kharaulakh and Lena-Anabar), with characteristic paragenesis of active structures developing in these areas connected with different regimes of the stress-strain state of the crust.

The seismotectonic deformation (STD) field was reconstructed from the data on focal mechanisms of 78 earthquakes with $M \geq 3.5$ occurred in the study area from 1927 to 2014. The analysis shows a general predominance of subhorizontal normal-fault deformations oriented in NE–SW direction transversely to main structural elements at the southeastern flank of the Gakkel ridge, on the Laptev Sea shelf and in the Lena-Anabar segment. Transition STD regimes are observed at the northwestern flank of the Verkhoyansk fold system, in the Buor-Khaya zone of the Kharaulakh segment (undertensional faults) and in the folded system of the Polousniy ridge (transpressional fault). Finally, the STD regime is changed to thrust fault in the Cherskiy seismotectonic zone. The principal compression is oriented in NE–SW direction. In the area of dynamical impact of the Chai-Yureinsk fault we observe a strike-slip regime, tension and compression are equal.

Thus, we have determined from structural, geological and seismological data that the investigated region is influenced by different geodynamic processes: rifting is observed along the spreading Gakkel ridge and throughout the territory of the Laptev Sea shelf, a suture of the midocean and continental structures of the crust (the Haraukaht segment) is a transition zone, and a compression regime dominates in the Cherskiy seismotectonic zone.

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