GC2024-SG006

Focal mechanisms of earthquakes occurred in 1927–2022 in the East Arctic region

Alena I. Filippova[1,2] , Ilya S. Burlakov[2,3] , Anastasia S. Fomochkina[3,2]

[1] Pushkov Institute of Terrestrial Magnetism, Ionosphere and Radiowave Propagation of the Russian Academy of Sciences
[2] Institute of Earthquake Prediction Theory and Mathematical Geophysics, Russian Academy of Sciences
[3] I.M. Gubkin Russian State University of Oil and Gas (National Research University)

aleirk@mail.ru

The East Arctic region is characterized by a complex geological structure and relatively high level of seismic activity. Nevertheless, it is poorly-studied due to its remoteness. Determination of earthquake focal mechanisms is also restricted due to a small number of regional seismic stations and inappropriate geometry of seismic network. In such a case, available solutions of focal mechanisms are of high value for various fundamental and practical purposes.

In this study, we compile a database of earthquake focal mechanisms for the East Arctic region using information from international seismological agencies and literature sources. It consists of 595 focal mechanism solutions for 273 seismic events with M = 3.5–7.6 occurred in 1927–2022. Source depths, scalar seismic moments, and moment magnitudes are also presented there for many events. In addition to the source parameters, their quality assessments are available that facilitates a comparison of different solutions. For user convenience, the database has a graphical interface that allows searching by various attributes (coordinates, time, magnitude, and depth).

Our database significantly exceeds in terms of volume of the collected information all the analogues available at the current time. It can be used to perform a seismotectonic analysis, to estimate the stress-strain state of the lithosphere, and to assess seismic hazard for the entire East Arctic region or its separate areas. We illustrate implementation of the compiled database for comparison of different solutions of earthquake focal mechanisms and their seismotectonic analysis on an example of seismic events occurred in the Olenek Bay of the Laptev Sea and adjacent territories.

The database is available at https://www.itpz-ran.ru/ru/resultaty/maps-and-databases/east-arctic/ (registration No. 122041300106-8 from 19.02.2024). We suggest adding new information to the database every five years in the future.

The study was supported by the Russian Science Foundation, Grant No. 21-77-10070.