The ML scale in western Eurasian Arctic

© 2020 A.N. Morozov[1,2], N.V. Vaganova[2], V.E. Asming[3], Z.A. Evtyugina[3]

[1]*GS RAS, Obninsk, Russia*; [2]*FCIARctic, Arkhangelsk, Russia*; [3]*KoB GS RAS, Apatity, Russia*

Abstract The local magnitude scale ML was refined for the western part of the Eurasian Arctic on the basis of data from seismic stations operating on the archipelagos of Svalbard, Franz Josef Land, and Severnaya Zemlya: $-\lg A_0(R) = 1.5 \cdot \lg(R/100) + 1.0 \cdot 10^{-4}(R-100) + 3.0$. Refinement was carried out on the basis of a sample of 167 earthquakes and 612 amplitude values at 5 seismic stations. The sample covered earthquakes that occurred in the main seismically active zones of the Eurasian Arctic for the period from January 2016 to April 2019. The refined scale can be applied in wide ranges of epicentral distances and magnitudes. The ML scale with the corresponding station corrections will be introduced into the practice of daily processing of seismological data from the western part of the Eurasian Arctic.

Keywords Local magnitude scale, Eurasian Arctic, station correction.

References

Alsaker, A., Kvamme, L.B., Hansen, R.A., Dahle, A., & Bungum, H. (1991). The ML scale in Norway. *Bulletin of the Seismological Society of America*, *81*(2), 379-398.

Antonovskaya, G.N., Kapustian, N.K., Konechnaya, Y.V., & Danilov, A.V. (2020). Registration Capabilities of Russian Island-Based Seismic Stations: Case Study of the Gakkel Ridge Monitoring. *Seismic Instruments*, *56*(1), 33-45.

Bakun, W.H., & Joyner, W.B. (1984). The ML scale in Central California. *Bulletin of the Seismological Society of America*, *74*(5), 1827-1843.

Dyagilev, R.A. (2015). [ML scale in Middle Urals]. In *Materialy X Mezhdunarodnoy seysmologicheskoy shkoly "Sovremennyye metody obrabotki i interpretatsii seysmologicheskikh dannykh", otv. red. A.A. Malovichko* [Proceedings of the X International Seismological Workshop "Modern Methods of Processing and Interpretation of Seismological Data", A.A. Malovichko (ed.)] (pp. 118-122). Obninsk, Russia: GS RAS Publ. (In Russ.).

Gabsatarova, I.P. (2006). [Introduction into routine practice divisions of the Geophysical Survey of RAS calculation procedure of the local magnitude]. In *Materialy Mezhdunarodnoi seismologicheskoi shkoly "Sovremennye metody obrabotki i interpretatsii seismologicheskikh dannykh"* [Proceedings of the International Seismological Workshop "Modern Methods of Processing and Interpretation of Seismological Data"] (pp. 49-53). Obninsk, Russia: GS RAS Publ. (In Russ.).

Hutton, L.K., & Boore, D.M. (1987). The ML scale in southern California. *Bulletin of the Seismological Society of America*, *77*(6), 2074-2094.

Krasilov, S.A., Kolomiets, M.V., & Akimov, A.P. (2006). [Organization of the processing of digital seismic data with the use of WSG program complex]. In *Materialy mezhdunarodnoi seismologicheskoi shkoly "Sovremennye metody obrabotki i interpretatsii seismologicheskikh dannykh"* [Proceedings of the International Seismological Workshop "Modern Methods of Processing and Interpretation of Seismological Data"] (pp. 77-83). Obninsk, Russia: GS RAS Publ. (In Russ.).

Morozov, A.N., Vaganova, N.V., Ivanova, E.V., Konechnaya, Y.V., Fedorenko, I.V., & Mikhaylova, Y.A. (2016). New data about small-magnitude earthquakes of the ultra-slow-spreading Gakkel Ridge, Arctic Ocean. *Journal of Geodynamics*, *93*, 31-41.

Richter, C.F. (1935). An instrumental earthquake scale. *Bulletin of the Seismological Society of America*, *25*, 1-32.

Richter, C.F. (1958). *Elementary Seismology*. San Francisco, USA: WH Freeman and Company. 768 p.

Rogozhin, E.A., Kapustian, N.K., Antonovskaya, G.N., & Konechnaya, Y.V. (2016). New seismicity map for the European sector of the Russian Arctic region. *Geotectonics*, *50*(3), 238-243.

Information about authors

Morozov Alexey Nikolaevich, PhD, Leading Researcher of the Geophysical Survey of the Russian Academy of Sciences (GS RAS), Obninsk, Russia; Leading Researcher of the N. Laverov Federal Center for Integrated Arctic Research (FCIARctic), Arkhangelsk, Russia ORCID: 0000-0001-9958-5974. E-mail: morozovalexey@yandex.ru

Vaganova Natalya Vladislavovna, PhD, Senior Researcher of the N. Laverov Federal Center for Integrated Arctic Research (FCIARctic), Arkhangelsk, Russia. E-mail: nvag@yandex.ru

Asming Vladimir Ernestovich, PhD, Leader Scientist of the Kola Branch of Geophysical Survey of Russian Academy of Sciences (KoB GS RAS), Apatity, Russia. E-mail: asmingve@mail.ru

Evtyugina Zinaida Anatol'evna, PhD, Researcher of the KoB GS RAS, Apatity, Russia. E-mail: zina_evt@mail.ru