

## Seismicity of the South Far East of Russia in 2020

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**Abstract.** The paper presents an overview of the seismicity of the southern part of the Russian Far East for 2020: the Amur–Primorye region, Sakhalin and Kuril-Okhotsk regions. It is based on the preliminary data from the earthquake catalogs of the Sakhalin Branch of the Federal Research Center “United Geophysical Survey of the Russian Academy of Sciences” (SB FRC UGS RAS). An analysis of the seismicity of the regions for 2020 in comparison with the previous decade is performed. Information about the earthquakes of 2020, which are the most significant and worthy of separate study, is given. These events occurred in the SB FRC UGS RAS responsibility zone: an earthquake near the Zeyskaya HPP, a deep-focus earthquake in the Tatar Strait, an earthquake at intermediate depths in the Southern Kuril Islands, a reverse fault earthquake on the bend of the Pacific lithospheric plate in the Northern Kuril Islands. According to formal indicators, the seismicity of the regions in 2020 remained within the background values, but it approached the upper limit of their range in the Kuril-Okhotsk region and in the mantle under the territory of the Sakhalin region.

**Keywords:**

**earthquakes, seismicity, seismic activity,**

**Amur region, Primorye, Sakhalin, Kuril-Okhotsk region**

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## References

1. Gusev A.A., Mel'nikova V.N. **1990**. [Relations between magnitudes: global and Kamchatka data]. *Vulkanologiya i seismologiya = Volcanology and Seismology*, 6: 55–63. (In Russ., abstr. in Engl.).
2. Kim Ch.U., Andreeva M.Yu. **2009**. [Earthquake catalog of the Kuril-Kamchatka region (1737–2005)]. Preprint. Yuzhno-Sakhalinsk: IMGIG DVO RAN, 126 p.
3. Kovalenko N.S., Fokina T.A., Safonov D.A. **2019**. Priamurye and Primorye. *Earthquakes in Northern Eurasia*. 22(2013): 161–172. (In Russ., abstr. in Engl.). <https://doi.org/10.35540/1818-6254.2019.22.14>
4. Kostylev D.V. **2021**. [Formation of a unified system for collecting seismological information in the Sakhalin Branch of GS RAS]. *Rossiiskii seismologicheskii zhurnal = Russian J. of Seismology*, 3(2): 41–53. (In Russ.). <https://doi.org/10.35540/2686-7907.2021.1.03>
5. Poplavskaya L.N. (ed.) **2006**. [Regional earthquake catalog of Sakhalin Island, 1905–2005]. Yuzhno-Sakhalinsk: IMGIG DVO RAN, 103 p. (In Russ.).
6. Prytkov A.S., Vasilenko N.F. **2021**. The March 25, 2020  $M_w$  7.5 Paramushir earthquake. *Geosistemy perehodnykh zon = Geosystems of Transition Zones*, 5(2):113–127. (In Russ. & Engl.). <https://doi.org/10.30730/gtr.2021.5.2.113-120.121-127>
7. Riznichenko Yu.V. **1964**. Metod summirovaniia zemletriasenii dlia izucheniiia seismicheskoi aktivnosti [Studying the seismic activity by the method of earthquakes summation]. *Izv. AN SSSR. Ser. geofizicheskaya*, 7: 969–977. (In Russ.).
8. Saltykov V.A. **2011**. A statistical estimate of seismicity level: The method and results of application to Kamchatka. *J. of Volcanology and Seismology*, 5: 123–128. <https://doi.org/10.1134/S0742046311020060>
9. Safonov D.A., Kononov A.V. **2017**. Moment tensor inversion in the Kuril-Okhotsk and Sakhalin regions using ISOLA software. *Tikhookeanskaya geologiya*, 36(3): 102–112. (In Russ.).
10. Safonov D.A., Fokina T.A., Kovalenko N.S. **2019a**. Seismicity of the South Far East of Russia in 2018. *Geosistemy perehodnykh zon = Geosystems of Transition Zones*, 3(4): 364–376. (In Russ., abstr. in Engl.). <https://doi.org/10.30730/2541-8912.2019.3.4.364-376>
11. Safonov D.A., Nagornyy T.V., Kovalenko N.S. **2019b**. *Seismicity of the Amur and Primorye regions*. Yuzhno-Sakhalinsk: IMGIG FEB RAS, 104 p. (In Russ., abstr. in Engl.).
12. Safonov D.A., Kostylev D.V., Fokina T.A., Kovalenko N.S. **2020**. Seismicity of the South Far East of Russia in 2019. *Geosistemy perehodnykh zon = Geosystems of Transition Zones*, 4(2): 146–159. (In Russ., abstr. in Engl.). <https://doi.org/10.30730/gtr.2020.4.2.146-159>

13. Semenova E.P., Boginskaya N.V., Kostylev D.V. **2020**. Ulegorsk earthquake on September 13, 2020 (Sakhalin Island): preconditions for the occurrence and the results of observations in the epicentral zone. *Geosistemy perehodnykh zon = Geosystems of Transition Zones*, 4(4): 474–485. (In Russ., abstr. in Engl.). <https://doi.org/10.30730/gtr.2020.4.4.474-485>
14. Fokina T.A., Kovalenko N.S., Kostylev D.V., Levin Yu.N., Likhacheva O.N., Mikhailov V.I. **2018**. Priamurye and Primorye, Sakhalin and Kuril-Okhotsk region. In: *Zemletryaseniya Rossii v 2016 gody [Earthquakes in Russia, 2016]*. Obninsk: FRC UGS RAS, 45–53. (In Russ.)
15. Fokina T.A., Safonov D.A., Kostylev D.V., Mikhaylov V.I. **2019**. Sakhalin. *Earthquakes in Northern Eurasia*, 22(2013): 173–183. (In Russ., abstr. in Engl.). [doi: 10.35540/1818-6254.2019.22.15](https://doi.org/10.35540/1818-6254.2019.22.15)
16. Chebrov V.N., Kugaenko Yu.A., Vikulina S.A., Kravchenko N.M., Matveenko E.A., Mitiushkina S.V., Raevskaya A.A., Saltykov V.A., Chebrov D.V., Lander A.V. **2013**. [Deep earthquake in the Sea of Okhotsk 24.05.2013 with a magnitude  $M_w = 8.3$  – the strongest seismic event near Kamchatka coastline for the period of detailed seismological observations]. *Vestnik KRAUNTS. Nauki o Zemle = Bull. of KRAESC. Earth Sciences*, 1(21): 17–24. (In Russ.).
17. Benioff H. **1951**. Earthquakes and rock creep. *Bull. of the Seismological Society of America*, 41(1): 31–62. <https://doi.org/10.1785/bssa0410010031>
18. Gutenberg B., Richter C.F. **1942**. Earthquake magnitude, intensity, energy, and acceleration. *Bull. of the Seismological Society of America*, 32(3): 163–191. <https://doi.org/10.1785/BSSA0320030163>
19. Sokos E., Zahradník J. **2013**. Evaluating centroid moment tensor uncertainty in the new version of ISOLA software. *Seismological Research Letters*, 84: 656–665. <https://doi.org/10.1785/0220130002>
20. Ye L., Lay T., Kanamori H. **2021**. The 25 March 2020  $M_w$  7.5 Paramushir, northern Kuril Islands earthquake and major ( $M_w \geq 7.0$ ) near-trench intraplate compressional faulting. *Earth and Planetary Science Letters*, 556: 116728. <https://doi.org/10.1016/j.epsl.2020.116728>