

Formation of a unified system for collecting seismological information in the Sakhalin Division GS RAS

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Abstract The main stages of creation and development of a seismic monitoring network of the Sakhalin Division GS RAS are considered. The main types of seismic data recording equipment used in the Sakhalin Division GS RAS are listed. The structure of the seismological data collection system of the Sakhalin Division GS RAS and its components are presented. The concept of creation and operation of autonomous points of instrumental seismic observations, as the main element of the development of a system for collecting seismological data, is proposed. The implementation of autonomous points of instrumental seismic observations is shown in detail on the example of the creation of emergency rescue centers for monitoring and forecasting emergency situations on the Kuril Islands of the EMERCOM of Russia in the Sakhalin Region. An assessment of the current state of the system for collecting seismological data in the Sakhalin Division GS RAS and its registration capabilities is given. The significance of the system for collecting seismological data of the Sakhalin Division GS RAS as a part of the large-scale research facilities of the GS RAS - a complex of continuous seismic monitoring of the Russian Federation, adjacent territories, and the world.

Keywords Far East, seismic station, seismological observations, digital recording, seismic instruments, registration capabilities, large-scale research facilities.

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References

- Chebrov, V.N. (2013). [Regional seismic monitoring system]. In *Problemy kompleksnogo geofizicheskogo monitoringa Dal'nego Vostoka Rossii. Materialy IV regional'noi nauchno-tehnicheskoi konferentsii* [Proceedings of the IV regional scientific and technical conference “Problems of complex geophysical monitoring of the Russian Far East”] (pp. 8-15). Petropavlovsk-Kamchatsky, Russia: GS RAS Publ. (In Russ.).
- Chebrov, V.N., Droznin, D.V., Sergeev, V.A., & Pantiukhin, E.A. (2010). [System for collecting, processing, storing and presenting seismological data and the results of their processing in the SP SPC, hardware, algorithms and software]. In *Problemy kompleksnogo geofizicheskogo monitoringa Dal'nego Vostoka Rossii. Materialy II regional'noi nauchno-tehnicheskoi konferentsii* [Proceedings of the II regional scientific and technical conference “Problems of complex geophysical monitoring of the Russian Far East”] (pp. 332-336). Petropavlovsk-Kamchatsky, Russia: GS RAS Publ. (In Russ.).
- Chebrov, V.N., Gusev, A.A., Droznin, D.V., Mishatkin, V.N., Sergeev, V.A., Shevchenko, Yu.V., & Chebrov, D.V. (2010). [The first stage of the seismic subsystem of the Tsunami warning service]. In *Problemy kompleksnogo geofizicheskogo monitoringa Dal'nego Vostoka Rossii. Materialy II regional'noi nauchno-tehnicheskoi konferentsii* [Proceedings of the II regional scientific and technical conference “Problems of complex geophysical monitoring of the Russian Far East”] (pp. 327-331). Petropavlovsk-Kamchatsky, Russia: GS RAS Publ. (In Russ.).
- Chebrov, V.N., Gusev, A.A., Droznin, D.V., Mishatkin, V.N., Sergeev, V.A., Chebrov, D.V., & Shevchenko, Yu.V. (2012). [Development of seismological observations in the Russian Far East for the tsunami warning service]. In *Seismologicheskie i geofizicheskie issledovaniia na Kamchatke. K 50-letiiu detaльnykh seismologicheskikh nabliudeniĭ* [Seismological and geophysical research in Kamchatka. To the 50th anniversary of detailed seismological observations] (pp. 70-104). Petropavlovsk-Kamchatsky, Russia: Novaia kniga Publ. (In Russ.).
- Davis, P., Berger, J., & Chavez, D. (1999). The IDA Near Real-Time System. *IRIS Newsletter*, 18(1), 5-6.
- Droznin, D.V., Chebrov, D.V., Droznina, S.Ya., & Ototiuk, D.A. (2017). [Automated estimation of instrumental seismic intensity in soft real time and use it within the service of urgent seismic reports in Kamchatka]. *Seismicheskie pribory* [Seismic Instruments], 53(3), 5-19. (In Russ.).
- Dyagilev, R.A. (2020). [Programma rascheta registratsionnykh vozmozhnostei seismicheskikh setei i grupp, SArra]. Certificate of state registration of a computer program No. 2020662170 dated 09.10.2020. Moscow, Russia. (In Russ.).
- Gee, L.S., & Leith, W.S. (2011). The Global Seismographic Network: U.S. *Geological Survey Fact Sheet*, 3021, 2 p.
- Gordeev, E.I., Malovichko, A.A., Chebrov, V.N., Gubina, L.V., & Levin, Yu.N. (2010). [Development of seismological observations in the Russian Far East. Results, problems, prospects]. In *Problems of complex geophysical monitoring of the Russian Far East. Materials of the II regional scientific and technical conference* [Proceedings of the II regional

- scientific and technical conference “Problems of complex geophysical monitoring of the Russian Far East”] (pp. 29-33). Petropavlovsk-Kamchatsky, Russia: GS RAS Publ. (In Russ.).
- GOST R 57546-2017. (2019). [Earthquakes. Seismic intensity scale]. Moscow, Russia: Standardinform Publ., 27 p. (In Russ.).
- GS RAS. (2021). Retrieved from <http://www.gsras.ru/>
- Hutt, C. (1993). Installation of Yuzhno-Sakhalinsk. *IRIS Newsletter*, 12(1), 12-17.
- Korsuntsev, V.G. (2008). [Comparison of magnitude and energy characteristics of earthquakes according to records of digital and analog equipment at the seismic station “Yuzhno-Kurilsk”]. In *Materialy III Mezhdunarodnoy seismologicheskoy shkoly “Sovremennyye metody obrabotki i interpretatsii seismologicheskikh dannykh”* [Proceedings of the III International Seismological Workshop “Modern Methods of Processing and Interpretation of Seismological Data”] (pp. 71-75). Odninsk, Russia: GS RAS Publ. (In Russ.).
- Kostylev, D.V. (2016). [State of the seismological network of the Sakhalin branch of the Federal Research Center of the EGS RAS]. In *Materialy XI Mezhdunarodnoy seismologicheskoy shkoly “Sovremennyye metody obrabotki i interpretatsii seismologicheskikh dannykh”* [Proceedings of the XI International Seismological Workshop “Modern Methods of Processing and Interpretation of Seismological Data”] (pp. 169-172). Odninsk, Russia: GS RAS Publ. (In Russ.).
- Krasilov, S.A., & Semenov, A.M. (2007). [Equipping the IOC VKM with software and hardware for organizing observations in a mode close to real time, using the example of the Storozhevoe seismic station]. In *Materialy II Mezhdunarodnoy seismologicheskoy shkoly “Sovremennyye metody obrabotki i interpretatsii seismologicheskikh dannykh”* [Proceedings of the II International Seismological Workshop “Modern Methods of Processing and Interpretation of Seismological Data”] (pp. 117-120). Odninsk, Russia: GS RAS Publ. (In Russ.).
- Mishatkin, V.N., Zakharchenko, N.Z., & Chebrov, V.N. (2011). [Hardware for the seismic subsystem of the tsunami warning service]. *Seismicheskie pribory* [Seismic Instruments], 47(1), 26-51. (In Russ.).
- Miyamachi, H., Ichianagi, M., Maeda, T., Yamaguchi, T., Takada, M., Takahashi, H., ... & Gunbina, L. (2009). Construction of the broadband seismic network in Far Eastern Russia for imaging the stagnant slab. *Geophysical Bulletin of Hokkaido University*, 72, 37-49.
- O federal'noi tselevoi programme “Snizhenie riskov i smiagchenie posledstvii chrezvychainykh situatsii prirodного i tekhnogennogo kharaktera v Rossiiskoi Federatsii do 2010 goda”* [On the federal target program “Reducing risks and mitigating the consequences of natural and man-made emergencies in the Russian Federation until 2010”]. (2006). In *Postanovlenie Pravitel'stva Rossiiskoi Federatsii ot 06.01.2006 g. N 1* [Resolution of the Government of the Russian Federation dated 06.01.2006 No. 1]. Moscow, Russia. (In Russ.).
- O federal'noi tselevoi programme “Snizhenie riskov i smiagchenie posledstvii chrezvychainykh situatsii prirodного i tekhnogennogo kharaktera v Rossiiskoi Federatsii do 2015 goda”* [On the federal target program “Reducing risks and mitigating the consequences of natural and man-made emergencies in the Russian Federation until 2015”]. (2006). In *Postanovlenie Pravitel'stva Rossiiskoi Federatsii ot 07.07.2011 g. N 555* [Resolution of the Government of the Russian Federation dated 07.07.2011 g. No. 555]. Moscow, Russia. (In Russ.).
- Ob utverzhdenii federal'noi tselevoi programmy “Sotsial'no-ekonomicheskoe razvitiye Kuril'skikh ostrovov (Sakhalinskaia oblast') na 2016–2025 gody”* [On approval of the federal target program “Social and economic development of the Kuril Islands (Sakhalin region) for 2016–2025”]. (2015). In *Postanovlenie Pravitel'stva Rossiiskoi Federatsii ot 17 avgusta 2015 g. N 33* [Resolution of the Government of the Russian Federation No. 33 dated August 17, 2015]. Moscow, Russia. (In Russ.).
- Oskorbin, L.S., & Bobkov, A.O. (1997). [Macroseismic manifestation of earthquakes in the southern part of the Far East]. In *Problemy seismicheskoi opasnosti Dal'nevostochnogo regiona* [Seismic hazard problems in the Far East region] (pp. 45-64). Yuzhno-Sakhalinsk, Russia: IMGG FEB RAS Publ. (In Russ.).
- Spirin, A.I., & Levin, Yu.N. (2008). *Seismicheskaya stantsiya “Iuzhno-Sakhalinsk”. 60 let otechestvennym instrumental'nym nabliudeniem na Sakhaline* [Seismic station “Yuzhno-Sakhalinsk”. 60 years of Russian instrumental observations on Sakhalin]. Yuzhno-Sakhalinsk, Russia: GS RAS Publ., 32 p. (In Russ.).
- Starovoit, O.E., & Chernobai, I.P. (1994). [Russia's participation in international seismic observation projects]. In *Federal'naia sistema seismologicheskikh nabliudenii i prognoza zemletriasenii (Informatsionno-analiticheskii biulleten')*. N 2 [Federal system of seismological observations and earthquake prediction (Information and analytical bulletin)]. N 2] (pp. 33-40). Moscow, Russia: EMERCOM of the Russian Federation & RAS Publ. (In Russ.).
- Urabe, T. (1992). WIN-A program on workstation for support of manual phase picking process on seismograms recorded by micro earthquake observation network. *Programme and Abstract, Seism. Soc. Japan*, 2, 41.

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