
METADATA IN ENGLISH

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Automated estimation of instrumental seismic intensity in soft real time and use it within the service of urgent seismic reports in Kamchatka

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Highlights

- Automated service of instrumental seismic intensity estimation is created
- Intensity is estimated by strong motion station data in near real time
- Accelerometers are located in 55 points, 21 of them near in Petropavlovsk-Kamchatsky
- Obtained estimations are reported to emergency services and other agencies urgently
- 75 reports on earthquake intensity were issued, including Zhupanovsky ($M_W = 7.2$)

Abstract

Early warning systems help to prevent losses of life and to reduce the economic and material impact of earthquakes. These systems combine several components: predictive systems (for example, the tsunami warning system), earthquake early warning systems, emergency message services, and systems monitoring the earthquake induced damages. Information about intensity of the ground shaking becomes especially important in case of a strong earthquake. These data are necessary for emergency rescue operations planning. Such information is difficult to collect in a natural disasters situation because of possible communication problems. Data of instrumental seismic intensity provides a possible option for solving this problem. Early warning systems predicting distributions of seismic intensities just after occurrence of an earthquake are already developed in many seismically active regions of the world. Implementation of such system is also necessary in Kamchatka where strongest earthquakes can produce extremely high values of the strong motion acceleration. As a result of development of seismological observations system in Kamchatka a unified specialized system for the collection, transmission, archiving and processing of seismic information was created. Seismological observations in Kamchatka were significantly improved with the renovation of the tsunami warning service in 2006–2011. As a result, a network of strong motions stations is currently operating in Kamchatka and can serve as a basis for creating near real-time seismic early warning system. With this purpose, we have created a special automated service that is now operated by the Kamchatka Branch of the GS RAS (KBGS). It uses the data of the strong motions stations to estimate the instrumental seismic intensity in near real time and visualizes the obtained results. This service is used to immediately provide the interested agencies with information about the level of the shaking intensity in vicinities of stations within the Service of Emergency Reports and of the Tsunami Warning System in the Kamchatka and Sakhalin branches of the GS RAS. 75 messages were sent about instrumental intensity in various areas Kamchatka and the Northern Kuriles (Paramushir Island) since the beginning the service became operational (at the end of 2014). Current version of service showed itself as highly informative and useful in the work of special units of the Ministry of the Russian Federation for Civil Defence, Emergencies and Elimination of Consequences of Natural Disasters. Also, diffusing these early warnings within different divisions of the KBGS improved their interaction. Moreover, the data generated by the system are used in some fundamental research. Further development of this early warning service requires increasing density of

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the strong motion network and developing a fully automatic algorithm for the decision-making and for sending the messages.

Keywords: earthquake, tsunami, data acquisition system, instrumental seismic intensity, early warning system, urgent reports service, consequence mitigation.

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