

Results of the infrasonic array on the Valaam Island primary data processing

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Abstract The infrasound array VALS developed in Kola Branch GS RAS has been installed in June 2016 on the Valaam Island in addition to the continuously operating seismic station VALR. The array consists of 3 spaced low-frequency microphones. The data with sampling rate 100 Hz are stored continuously at the acquisition computer; the timing is carried out using GPS. In addition to the acquisition system, an infrasound signal detector is installed on the computer. It works in near real time mode and enables to find signals and compute their back azimuths. At the end of 2018, a new version of the detector was developed at the Kola Branch GS RAS. The detector began to work much faster, which enabled us to carry out data processing for 2.5 years in two frequency ranges in a short time. The main task of the array is acoustic monitoring, the detection of infrasound events, the determination of their parameters, and the selection of events of natural origin. The data are also used (in combination with the VALR seismic station data) to locate near seismic events, especially weak ones. The analysis of the obtained data revealed the prevailing directions to the signal sources. The change of directions to sources in time was investigated, seasonal features were revealed. Acoustic events were detected in the frequency bands 1-5 Hz and 10-20 Hz, and a significant difference was found in the azimuthal distribution of events for these ranges. A joint analysis of acoustic and seismic data showed that the part of events with both acoustic and seismic components is low - it is almost completely exhausted by career explosions. It was also noted that in addition to explosions in nearby quarries (Kuznechnoye, Pitkäranta) located at a distance of 50-60 km, according to acoustic data, events corresponding to explosions at quarries located at a distance of 100 km or more were repeatedly identified.

Keywords Infrasound, brontide, infrasound detector, Valaam.

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References

Asming, V.E., Baranov, S.V., Vinogradov, Yu.A., & Voronin, A.I. (2012). [Seismoinfrasound monitoring in Svalbard]. *Seismicheskie pribory* [Seismic instruments], 48(3), 20-33. (In Russ.).

Assinovskaya, B.A. (2005). [Seismic events on Lake Ladoga in the 20th century]. *Izvestiya RGO* [News of the Russian Geographical Society], 137, 70-77. (In Russ.).

Assinovskaya, B.A., & Nikonov, A.A. (1998). [Mysterious phenomena on Lake Ladoga]. *Priroda* [Nature], 5, 49-53. (In Russ.).

Assinovskaya, B.A., Ovsov, M.K., Karpinsky, V.V., & Mekhryushev, D.Yu. (2009). [Seismic events on Lake Ladoga]. *Georisk* [Georisk], 3, 6-12. (In Russ.).

Karpinsky, V.V. (2016). [The decade of continuous seismological observations on Valaam Island]. In *Materialy XIII Mezhdunarodnoi seismologicheskoi shkoly "Sovremennye metody obrabotki i interpretatsii seismologicheskikh dannykh"* [Proceedings of the XIII International Seismological Workshop "Modern Methods of Processing and Interpretation of Seismological Data"] (pp. 155-159). Obninsk, Russia: GS RAS Publ. (In Russ.).

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