Geophysical Research Abstracts
Vol. 16, EGU2014-11707, 2014
EGU General Assembly 2014

Northern Finland Seismological Network: a tool to analyse long-period seismological signals

Elena Kozlovskaya and Riitta Hurskainen
University of Oulu, Sodankylä Geophysical Observatory/Oulu unit, Oulu, Finland (elena.kozlovskaya@oulu.fi)

Sodankylä Geophysical Observatory of Oulu University (SGO) is located at 67˚ 22' N, 26˚ 38' E in the middle of Finnish Lapland. It was established in 1913 and since then has gained a long experience in carrying out multi-disciplinary geophysical observations in Arctic environment. Seismological observations at the University of Oulu and SGO have been carried out since 1965. During 2005-2008 the SGO modernized own sort-period permanent seismic network, enhanced the number of stations and equipped them with the VBB seismic sensors. The stations are located at latitudes from 65^0 N to 68^0 N. They form the Northern Finland Seismological Network (NFSN) that will be the part of Finnish EPOS research infrastructure in the future. The continuous seismic data of the NFSN are archived in the GFZ Seismological Data Archive of the GeoForschungsZentrum Potsdam (Germany) and in the own backup archive of the SGO. At the moment, the data of the NFSN are routinely used for monitoring of seismic activity in Northern Europe and world-wide and information about seismic events is published in several on-line bulletins. Due to the recent mineral exploration and mining boom in northern Finland, a new task for the NFSN will be recording and analysis of mining-induced seismicity and estimating of seismic hazard associated with it.

During installation of instruments of the NFSN, particular measures were taken in order to improve instruments performance at long periods. In Arctic conditions the performance of broadband seismic instruments is affected by large ambient temperature variations and geomagnetic field disturbances (geomagnetic pulsations). In 2007-2009 the NFSN was a part of the POLENET/LAPNET IPY project. In addition to lithosphere structure studies, the project aimed at registration of long-period glacial seismic events originating from Greenland Ice Sheet. Analysis of data recorded by the NFSN during the IPY demonstrated that the network is capable to record not only long-period glacial events from Greenland in the period range of 30-140 s, but also other slow events originating from the northern part of the Mid-Atlantic Ridge, as well as and long-period seismic signals from events originating from Arctic and Russia. Slow events are rarely reported by seismological agencies, because routine methods of events detection are based on analysis of short-period body waves. This motivated further development and enhancement of the NFSN. In 2013-2014 three new VBB seismic stations will be installed in the Finnish Lapland. Together with the existing NFSN station, they will form a broadband seismic array aiming at detection and location of seismic events in long-period range.

In our presentation we discuss factors affecting performance of VBB seismometers at long periods and problems connected with identification and location of slow events by array techniques.