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# Structure of Suasselkä Postglacial Fault in northern Finland obtained by analysis of ambient seismic noise

Nikita Afonin (2) and Elena Kozlovskaya (1)

(1) University of Oulu, Oulu Mining School, Oulu, Finland (elena.kozlovskaya@oulu.fi), (2) IEPN UB RAS, Arkhangelsk, Russia

Understanding inner structure of seismogenic faults and their ability to reactivate is particularly important in investigating the continental intraplate seismicity regime. In our study we address this problem using analysis of ambient seismic noise recorded by the temporary DAFNE array in northern Fennoscandian Shield. The main purpose of the DAFNE/FINLAND passive seismic array experiment was to characterize the present-day seismicity of the Suasselkä post-glacial fault (SPGF) that was proposed as one potential target for the DAFNE (Drilling Active Faults in Northern Europe) project. The DAFNE/FINLAND array comprised the area of about 20 to 100 km and consisted of 8 short-period and 4 broad-band 3-component autonomous seismic stations installed in the close vicinity of the fault area. The array recorded continuous seismic data during September, 2011-May, 2013. Recordings of the array have being analyzed in order to identify and locate natural earthquakes from the fault area and to discriminate them from the blasts in the Kittilä Gold Mine. As a result, we found several dozens of natural seismic events originating from the fault area, which proves that the fault is still seismically active. In order to study the inner structure of the SPGF we use cross-correlation of ambient seismic noise recorded by the array. Analysis of azimuthal distribution of noise sources demonstrated that that during the time interval under consideration the distribution of noise sources is close to the uniform one. The continuous data were processed in several steps including single station data analysis, instrument response removal and time-domain stacking. The data were used to estimate empirical Green's functions between pairs of stations in the frequency band of 0.1-1 Hz and to calculate correspondent surface wave dispersion curves. After that S-wave velocity models were obtained as a result of dispersion curves inversion using Geopsy software. The results suggest that the area of the SPGF corresponds to a narrow region of low S-wave velocities surrounded by rocks with high S-wave velocities. We interpret this low velocity region as a non-healed mechanically weak fault damage zone (FDZ) remained after the last major earthquake that occurred after the last glaciation.
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DAFNE/FINLAND Working Group:
Ilmo Kukkonen
Pekka Heikkinen
Kari Komminaho
Elena Kozlovskaya
Riitta Hurskainen
Tero Raita
Hanna Silvennoinen