



Local seismicity in the area of Tornio River (northern Fennoscandia) revealed by analysis of local events registered by the POLENET/LAPNET array

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The region of Tornio river (22-26 deg E and 66.5-69 deg N) is very interesting for seismological studies because it is crossed by systems of tectonic faults spreading in two different directions. 56 local earthquakes originated from this region were recorded by the POLENET/LAPNET temporary array from May, 2007 to May, 2009. Hypocenter depths of earthquakes are in the range of 1-35 km and their magnitudes vary from 0.8 to 2.2. For events detection we used the bulletin of the Institute of Seismology (Helsinki university) and Norway Global Beam Forming bulletin, compiled on the base of automatic detection of events, using the data of Noress, Arcess, Finess, SPA, HFS, APA arrays. In addition to local earthquakes, the array recorded 364 blasts from this region during the POLENET/LAPNET observation period. The events were relocated using manually measured travel times of refracted P waves from events at local distances (less than 200 km) and the 1-D velocity model along the wide-angle reflection and refraction HUKKA profile. The epicenters of relocated events show good correlation with known faults in the region. For each earthquake we constructed travel-time curves with reduction velocity of 8 km/s and compared them with the theoretical travel-time curves, in order to avoid phase misinterpretation. We found out that the largest reduction of travel time residuals during relocation was reached for deep earthquakes, due to more precise depth determination. The other aim of our study was to estimate what part of travel time residuals is not connected with the reference 1D velocity model and accuracy of location, but is rather due to 3-D heterogeneities in the crust. We also analyzed the amplitude characteristics of P-wave arrivals from different layers in the crust and upper mantle and also compared spectrograms of deep earthquakes, shallow earthquakes and blasts.