



Aftershock sequence of ML6.1 earthquake in Sakhalin: recovery with waveform cross correlation

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The Sakhalin Island is characterized by relatively high seismic activity. The largest measured earthquake of $M_w=7.0$ occurred in 1995 near the town of Neftegorsk. It was followed by a long-lasting aftershock sequence. Based on the results of our previous analysis of this aftershock sequence with the method of waveform cross correlation (WCC), we have recovered an aftershock sequence of the ML 6.1 earthquake occurred on August 14, 2016 at 11:15:13.1 (UTC). The epicentre of this earthquake estimated by near-regional data has geographic coordinates 50.351N 142.395E, with the focal depth of 9 km. The aftershock catalogue compiled by the eqaler.ru resource includes 133 events within 20 days from the main shock. We used P- and S-wave signals from the main shock and a few largest aftershocks from the catalogue as waveform templates. Cross correlation of continuous waveforms with these templates was carried out at six closest seismic stations of the regional network, with four stations to northeast and two stations to southwest of the epicentre. For detection, we used standard STA/LTA method with thresholds depending on seismic phase and station. The accuracy of onset time estimation by the STA/LTA detector based on the obtained CC-traces is close to a few samples, with the sampling rate of 40 Hz at all stations. Arrival times of all detected signals were reduced to origin times using the observed travel times from the master-events to six stations. For a given master event, clusters of origin times are considered as event hypotheses in a local association procedure. When several master events find the same physical signal, we resolve conflict using the number of associated stations and then the RMS origin time residual. In total, more than 190 aftershocks were found with three and more associated stations and five and more associated phases. This is by 40% more than the number of aftershocks in the original catalogue. Their magnitudes vary between 1.5 and 4.5. We also applied the relative location procedure to all found aftershocks, which were moved closer to the main shock. The epicentres of relocated aftershocks tend to cluster in the narrow zone corresponding to the western (hanging) wing of the Central Sakhalin upthrust-thrust fault zone, which defines the boundary between the Okhotsk and Eurasian (or Amur) plates.