Detection of repeating earthquakes in the West Bohemia swarm region

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Repeating earthquakes, sequences of microseismic events with highly similar seismograms and magnitudes, suggest quasi-periodic rupturing of the same asperity. They are observed on creeping fault segments surrounded by aseismic slip area and also in earthquake swarms. However, so far, they have not been documented in the West Bohemia/Vogtland seismic swarm area. These local swarms consist of thousands of $M_L < 4$ events occurring along a small area of fault zone with repeated activation of some patches during the swarms and weak background activity in the intermediate periods. Detecting and analyzing the repeating earthquakes would help revealing the continuing background activity and identifying fault areas that are active permanently. This could point to the possible sources of fluids or aseismic creep that are supposed to play significant role in swarm generation. Repeating earthquakes are identified by waveform cross-correlation analysis comparing waveforms of repeaters with continuous seismic data set. We developed efficient detection algorithm to identify repeating earthquakes using selected event templates to reveal continuing seismic activity along the main Nový Kostel fault zone, namely in the areas with only episodic activity. The results provide a robust basis for routine application to the long-term seismic dataset that will allow also for further applications including analysis of the source parameters of the repeaters and/or detecting possible seismic velocity variations in the focal zone.