



Characterization of microseismic sequences in North-Western Switzerland using sonograms and waveform similarity analysis

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The SED (Swiss Seismological Service) recently reported 30 earthquakes close to the city of Biel. The seismic activity was clustered in periods of a few days – weeks in January 2014 and January-February 2015. Two events reaching local magnitudes above ML 3 were largely felt by the local population. With the aim to complete the catalog in the lower magnitude range, continuous broadband data of four local Swiss stations are reprocessed in the form of sonograms. Sonograms are spectrograms with a frequency-dependent noise adaptation on which earthquakes display typical frequency-time signatures that are easily recognized by the analyst down to the background seismic noise threshold. Events are then evaluated in HypoLine and better constrained by additional seismic-array records at the Mont-Terri rock laboratory in 2015. 170 low magnitude events ($ML < 1$) were positively correlated and associated to the two earthquake sequences. The events of interest show emergent P-onsets due to their low energies. Therefore, an approach that focuses on S-phase cross-correlation is used to derive event clustering. A linkage function applied on the cross-correlation matrices with correlation threshold above 80% returns several earthquake families, suggesting that ruptures occurred on different fault segments. This is supported by the focal mechanisms computed by the SED which show different fault plane solution for the main events.