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Passive seismic monitoring of propagating seismic sources at Super-Sauze (Southeastern France) and Pechgraben (Upper Austria) clay-rich landslides

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Passive seismic monitoring campaigns were carried out at two clay-rich landslides; at Super-Sauze in Southeastern France and at Pechgraben in Upper Austria. The aim was to investigate endogenous seismicity triggered by the landslide activity. Portable seismic networks were deployed in the form of tripartite arrays with aperture ranging from a few meters to about 30 m over active parts of the two landslides. During the monitored periods, the slopes showed displacement rates ranging from less than a few mm.d-1 to tens of cm.d-1. The short durations of the campaigns (day-week) permitted to analyze the complete datasets visually. Signal identification was done based on sonogram patterns of the seismic waveforms; where sonograms are spectrograms with dynamic frequency-dependent noise adaptation that facilitate the detection and characterization of events in low-SNR (signal-to-noise ratio) conditions. Records from individual stations were screened on a common timeline using various resampling scaling of the data. Following this approach, we detected minute-long seismic signals which display high amplitude initial onset ($\sim$ 30'000 nm/s), huge waveform dispersion in the signals coda as well as variations in the dominant frequency content in time and from one station to another that are consistent with a source propagating across the seismic network. Such signals were detected at both landslides and show distinct patterns when compared to known rockfall events. The sources appear to originate close to the shear boundaries of the landslides and propagate then within the slides. In a first appraisal, we interpret these signals as rupture propagation at the sliding interface, since at Super-Sauze, rotational sliding initiation could be observed close to the source origin in the time interval where such signals were observed.