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Complexity of low-frequency earthquakes activity in western Shikoku

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Short-duration transient seismic events known as low-frequency earthquakes (LFEs) are a component of the slow earthquakes family observed in the transition zone, at the root of seismogenic regions of the subduction zones or active faults. LFEs are the signature of impulse seismic energy radiation associated to and often mixed within complex tectonic tremor signal. Detailed analysis and characterization of LFE space-time activity in relation to other slow earthquake phenomena can provide important information about the state and the processes of fault interface.

We derive a catalog of LFEs in western Shikoku (Japan) by applying a full waveform coherency-based detection and location method to the 4-year continuous data covering the period of 2013-2016 and recorded at Hi-net seismic stations of NIED. The obtained catalog of over 150,000 detected events allows looking into the details of LFE space-time activity during the tectonic tremor sequences and inter-sequence periods.

We use this catalogue of LFEs to perform a systematic statistical analysis of the event occurrence patterns by applying correlation and clustering analysis to infer the large-scale (long temporal ~ 1-2 day duration) space-time characteristics and interaction patterns of activity and its potential relation to the structural complexity of the subducting plate. We also analyze the correlation between the migration of clustered LFE activity during energetic tremor sequences and short-term slow slip events occurring in the area during the analyzed period.