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Revealing Seismic Sequence Characteristics in the South-eastern Alps and the Western Dinarides by clustering analysis and refined location

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The study of the seismicity distribution in space and time is a key element for assessing seismic hazard, as earthquake occurrence is controlled by variations in crustal stress and fault loading. The identification and characterization of seismic sequences therefore represent an effective approach to investigate earthquake interaction and the activation of complex fault systems.

We analyze ten years of seismicity (2015–2024) in the South-Eastern Alps and the Western Dinarides (SEAWD), a tectonically active region characterized by moderate to high seismic hazard and by the occurrence of large historical earthquakes, including the Mw 6.5 Friuli event of 1976. The study is based on the seismic catalog of the Northeastern Italy Seismometer Network, managed by the Seismological Research Center (CRS) of the National Institute of Oceanography and Experimental Geophysics – OGS.

Seismic sequences are first detected using the Zaliapin and Ben-Zion nearest-neighbor clustering technique and subsequently analyzed with the NLL-SSST Coherence algorithm, which allows a detailed reconstruction of their spatio-temporal evolution and source coherence. A total of 75 seismic sequences are identified and classified: 49 Foreshock-Mainshock-Aftershock sequences (65%), 25 Mainshock-Aftershock sequences (32%), and one swarm-type sequence. The preliminary results indicate that Mainshock-Aftershock sequences are, on average, associated with larger mainshock magnitudes compared to Foreshock-Mainshock-Aftershock sequences.

Further analyses are currently underway to refine the characterization of the detected sequences and to explore their implications for fault interaction processes.