SESSION 29- Seismic Clustering and Stress Evolution in Complex Fault Systems: Insights from Geodesy, Geology, and Seismology

Conveners
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Session Description

Recent seismic sequences—such as the 2020 Salton Sea (USA), 2020–2021 Corinth (Greece), 2024 Santorini (Greece), and the 2025 Sındırgı and Marmara (Türkiye) events—demonstrate the complex nature of tectonic loading and fault interaction. Rather than producing a single, well-defined rupture, stress accumulation within fault systems can activate several interconnected structures, generating earthquake clusters that migrate or evolve across adjacent fault segments. These spatiotemporal patterns of seismicity provide insight into how stress is partitioned and redistributed through the crust during the interseismic and postseismic stages. A clearer understanding of these tectonic processes is essential for refining seismic hazard assessments, especially in regions where deformation is shared between both well-mapped and undocumented faults.

This session aims to bring together researchers from geology, geodesy, and seismology to examine how evolving stress fields shape the spatial and temporal organization of seismicity within interconnected fault systems. Our key objective is to integrate geophysical observations with geological and structural data to clarify the mechanisms that promote earthquake clustering among adjacent or distant fault segments. The session will serve as a platform for synthesizing diverse datasets and methodologies—ranging from field-based fault mapping to satellite geodesy and stress modeling—to bridge disciplinary gaps and refine our understanding of crustal deformation dynamics.

We welcome contributions addressing:

- pre- and post-seismic activity of moderate-to-large earthquakes;
- earthquake clusters along with hidden or blind fault systems through seismology, morphotectonics, and geodesy;

- stress transfer modeling and fault interaction with numerical tools such as Coulomb stress analysis;
- integration of GNSS/InSAR with seismicity to quantify strain distribution;
- machine-learning for spatiotemporal seismicity analysis;
- seismic hazard implications for regions of distributed deformation.

The session aims to encourage dialogue between geologists, seismologists, and geodesists to advance a unified perspective on how transient deformation controls earthquake recurrence and fault interaction. Contributions linking fault mechanics, temporal deformation, and seismic hazard assessment are especially welcome.