Spatio-temporal slip variability along Central Apennine faults: Insights from the paleoearthquake trenching and long-term slip rate on the Liri and Roccapreturo fault systems

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Résumé

Understanding the spatial and temporal variability of slip along individual faults and over complex fault systems is crucial for constraining the extent of co-seismic ruptures, estimating paleo-earthquake magnitudes, and refining seismic hazard assessments. While previous studies have primarily focused on timeframes spanning only a few seismic cycles, the long-term persistence of rupture barriers and cumulative slip distribution remains poorly constrained. In this study, we investigate slip variability across multiple timescales-from months to millions of years-along the Liri and Roccapreturo faults in the central Apennines.

These faults, located at the contact between Cretaceous limestone and Quaternary deposits, were analyzed through high-resolution topographic data derived from UAV-acquired imagery, Pleiades satellite and Lidar data, complemented by detailed field observations. Along the Liri fault, a _˜16 km-long northern segment displays a subdued scarp morphology with no Quaternary deposits observed on the hanging wall, contrasting with a southern 30 km-long section where sharp fault scarps offset multiple Quaternary surfaces. A _˜6–8 km-long relay

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zone separates fault segments striking between N110◦ and N160◦. Cosmogenic ^{3}Cl dating of two offset alluvial surfaces yields minimum slip rates of _˜0.4 to _˜2 mm/yr over the past 35–27 kyr. Paleoseismic trenching within Quaternary deposits revealed evidence for at least three surface-rupturing earthquakes in the past _˜2500 years, the most recent postdating 1226 CE.

The Roccapreturo fault system comprises a NE-verging main fault and a SW-verging antithetic fault, on which two trenches were excavated to characterize recent activity.
We will discuss how the displacement varies along both fault both in time and space.

Mots-Clés: morphotectonics, active fault, paleoseismology