



## **Non-tectonic exposure Rates along Bedrock Fault Scarps in an active Mountain Belt of the central Apennines**

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The central Apennines (Italy) are a mountain chain affected by post-collisional active extension along NW-SE striking normal faults and well-documented regional-scale uplift. Moderate to strong earthquakes along the seismogenically active extensional faults are frequent in this area, thus a good knowledge on the characteristics of the hosting faults is necessary for realistic seismic hazard models.

The studied bedrock fault surfaces are generally located at various heights on mountain fronts above the local base level of glacio-fluvial valleys and intermountain fluvio-lacustrine basins and are laterally confined to the extent of related mountain fronts. In order to investigate the exposure of the bedrock fault scarps from under their slope-deposit cover, a process that has often been exclusively attributed to co-seismic earthquake slip and used as proxy for tectonic slip rates and earthquake recurrence estimations, we have set up a measurement experiment along various such structures. In this experiment we measure the relative position of chosen markers on the bedrock surface and the material found directly at the contact with its hanging wall.

We present the results of monitoring the contact between the exposed fault surfaces and slope deposits at 23 measurement points on 12 different faults over 3.4 year-long observation period. We detected either downward or upward movements of the slope deposit with respect to the fault surface between consecutive measurements. During the entire observation period all points, except one, registered a net downward movement in the 2.9 - 25.6 mm/yr range, resulting in the progressive exposure of the fault surface. During the monitoring period no major earthquakes occurred in the region, demonstrating the measured exposure process is disconnected from seismic activity. We do however observe a positive correlation between the higher exposure in respect to higher average temperatures.

Our results indicate that the fault surface exposure rates are rather due to gravitational and landsliding movements aided by weathering and slope degradation processes. The so far neglected slope degradation and other (sub)surface processes should thus be carefully taken into consideration before attempting to recover fault slip rates using surface gathered data.

The results of the present studies have been recently published (Kastelic et al., 2016) and our research is ongoing, implementing the so-far results with newer measurements and other techniques in order to improve our knowledge on the magnitude of the exposure and its causative process(es).

Kastelic, V., P. Burrato, M. M. C. Carafa, and R. Basili (2016), Repeated surveys reveal nontectonic exposure of supposedly active normal faults in the central Apennines, Italy, *J. Geophys. Res. Earth Surf.*, 121, doi:10.1002/2016JF003953.