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Determining the kinematics of the Idrija fault (Northern Dinarides, Slovenia) using Lidar data.

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Located in central Europe between the southern Alps and the Dinarides, the$\approx$ 100km long Idrija fault, striking N310 and dipping $\approx$ 80°NE is often considered as the potential source of the 1511 earthquake (estimated magnitude: 6.9). However, although continental earthquakes of similar size are almost invariably associated with surface faulting, no surface traces have been found. In Europe identifying the faults capable of producing large earthquakes is difficult due to dense vegetation covering their trace and strong anthropization and erosion smoothing it. This is particularly true in Slovenia where no detailed map of the active faults is available and where the amount of deformation absorbed in this region is unknown. Those are, however, a prerequisite to estimate the expected magnitude of future large events and slip rates.

Using detailed topographical maps, satellite images (SPOT 5), 12.5m illuminated DEM and airborne Lidar data-derived 1m DEM, we examined in detail the Idrija fault trace along a 20 km long transect in the central portion of the fault. Combining those topographical and remote sensing data allow characterizing the recent activity along the Idrija fault and to estimate its cumulative displacement along strike.

Between Tolmin and Godovic, the fault trace is mostly rectilinear but appears divided into four disconnected segments of 6-11km long that are right-stepping on the northern portion and left-stepping south, along the mean strike of the fault zone. Morphological evidences such as offset streams and ridges and major drainage abandonment suggest ongoing movement. At four sites along the fault, a quantitative analysis of the offset topography markers based on field observations, Lidar DEM and kinematic GPS-derived DEM allow better constraining the kinematics of the fault (horinzontal and vertical displacements). A cumulative dextral offset comprised between 40 and 60m was measured at most studied sites. We found two larger offsets of $\approx$ 170 m and $\approx$ 430m long within the southernmost site. The estimated vertical component is significant since it accounts for about 20-30% of the total fault movement.