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# Application of airborne LiDAR to mapping seismogenic faults along the NE boundary of the Adria microplate, Slovenia

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Results are presented of the first airborne LiDAR survey ever flown in Europe for the purpose of mapping the surface expression of earthquake-prone faults. Detailed topographic images derived from LiDAR data of the Idrija and Ravne strike-slip faults in NW Slovenia reveal geomorphological and structural features that shed light on the overall architecture and kinematic history of both fault systems. The 1998 $M_W$ = 5.6, and 2004 $M_W$ = 5.2 Ravne Fault earthquakes and the historically devastating 1511 M = 6.8 Idrija earthquake indicate that both systems pose a serious seismic hazard in the region. Because both fault systems occur within forested terrain, a tree removal algorithm was applied to the data; the resulting images reveal surface scarps and tectonic landforms in unprecedented detail. Major fault traces, subordinate splays, and other fracture sets are visible. Fault breccia and gouge zones are easily discriminated by their textural expression. Oblique perspective views of the LiDAR data also reveal the attitude of folded bedding in steep terrain which was verified in the field. Importantly, two sites were discovered to be potentially suitable for fault trenching and palaeo-seismological analysis. This study highlights the potential contribution of LiDAR surveying in both low-relief valley terrain and high-relief mountainous terrain to a regional seismic hazard assessment programme, and to studying fault systems in general. Geoscientists working in other tectonically active regions of the world where earthquake-prone faults are obscured by forest cover would also benefit from LiDAR maps that have been processed to remove the canopy return and reveal the forest floor topography.