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# Use of a Laser-DTM for geological survey, structural interpretation and update of existing maps: example in the Jura mountains (Switzerland)

**C. Borlat** (1), J.-L. Epard (2) and M. Jaboyedoff (1)

(1) Institute of Geomatics and Risk Analysis, University of Lausanne, Switzerland, (2) Institute of Geology and Paleontology, University of Lausanne, Switzerland (Cedric.Borlat@unil.ch)

The high resolution Laser Digital Terrain Models (Laser-DTM) like the Swiss Laser-DTM with 1 point per 1 to 2 $m^2$, give several new tools for geological mapping and structural interpretation. Geological limits as well as tectonic structures can be detected and precisely mapped. The study area is located on the crest of a kilometer-size detachment anticline, the Mont Tendre anticline, in the Jura Mountains (Switzerland). The folded series are made up of well bedded Jurassic to Cretaceous sedimentary formations.

The main goal of this work is to update an existing geological map at the scale of 1:25'000. First, the limits of some formations are precisely located in the field using a GPS. Combined to a pocket PC, eventual misfits between the published document and the actual position of the limits are detected. On the shaded relief (DTM hillshade) the new geological limits are then mapped. Numerous discrepancies, for example limits literally cutting layers that are well visible on the hillshade. The often invisible trajectories of several tectonic features, mainly minor strike-slip faults, have been updated, and sometimes extended, connected or divided in more branches, which was previously impossible because of the absence of evidences in the field.

These new data allow for the analysis and quantification of the meter to decameter scale fracturing. The extension fracturing perpendicular to layers, located mainly on the crest of the anticline, has been mapped and interpreted. Moreover, the existence of a minor overlap, which was previously interpreted as a simple inverse fault, has been detected. Finally, the exact location and geometry of second order folds can be obtained.

This new approach coupled to conventional structural analysis greatly increases the precision of the geologic map up to a point where strain accommodated by decametric structures can be estimated. The comprehension of the structure of the field and therefore the geological profiles will be greatly enhanced. It will result in more detailed geological maps with less time involvement than traditional mapping.