Geology mapping with an emphasis on the Quaternary in the Swiss Prealps and Molasse Plateau

Valérie Baumann, Marc-Henri Derron, Jean-Luc Epard, and Michel Jaboyedoff
University of Lausanne, Institute of Earth Sciences, Switzerland (valerie.baumanntraine@unil.ch)

The main goal of this project is to harmonise the different geological maps (scale 1:25,000) and to improve the Quaternary mapping of the region of “canton de Vaud” in Switzerland using a high resolution LiDAR digital elevation model, and geophysical or boreholes data. We present here the results for the geologic mapping of two test areas: one in the Prealps and the second in the Molasse Plateau.

Detailed geological maps (scale 1:25,000) have been produced during the XX century for the whole region. During the last Late Glacial Maximum (LGM) the canton de Vaud area was covered by ice sheets, then soils and loose rock deposits were formed toward the end of ice age, however the Quaternary formations are sometimes not represented especially when their thickness is only of a few meters and the interpretation of geomorphologic features with aerial photographs was difficult in areas covered by forest.

In recent years, the high-resolution digital elevation model derived from high resolution LiDAR data with the possibility to remove the trees in the forested areas offers the possibility to detect and interpret new morphologies.

In this study, different LiDAR-derived hillshade maps have been used to improve the delimitation of bedrock and Quaternary formation through morphological feature analyse. Borehole data gave us fundamental data about geology and stratigraphy and field surveys were performed for selected places. Additionally, a terrain classification system first developed in Canada (Cruden and Thomson, 1987) was used to add information for each polygon like genetic material, surface expression, modifying processes and stratigraphic data. All the mapping was performed in a GIS (Geographic system information) environment.

Detailed bedrock and Quaternary mapping will provide very good information for the management of the resources, land planning and geo-hazards. The additional information (terrain classification) for each polygon allow us to create different thematic maps starting from the geological map.

Reference: