



Methodology to survey landscape evolution of a gorge-like topography by LiDAR technique

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Terrestrial LiDAR technique enables to survey accurately small scale area at short time interval. This is therefore a technique suitable to follow stream erosion for example. Unlike surveying rock cliff where LiDAR is applied for a few years now, survey of stream, *i.e.* a gorge-like topography, is more difficult to obtain. The purpose of this paper is to give a methodology to perform this type of survey.

This methodology can be divided in 4 steps:

- Data acquisition (field work)
- Point cloud data processing (by using Polyworks software)
- Handling of XYZ data and analysis (by using Geomensura and Polyworks software)
- Analysis of changes in morphology

The use of technique that enables cloud acquisition of millions of point is not straightforward. The acquiring of additional details could be time consuming during the data processing. Hence, the acquisition window has to be as small as possible. The general geometry, however, which is more longitudinal, implies that many scans are necessary to enable scan overlap during the data processing. The balance between the accuracy of the morphology and the duration of acquisition bring us to set the LiDAR resolution to approximately 1 point every 10 cm.

Polyworks is a powerful software to inspect high-density point clouds. It was used to merge individual scans together in order to obtain the description of the whole study area. Maps of change in elevation between different dates of acquisition were also compiled by this mean.

The data were put in an absolute reference, which enable to superimpose them. Two kinds of data were then generated for the purpose of the analysis: 2D cross-sections and maps of change in elevation. Change in morphology could then be associated with qualitative data surveyed in the field to assess the erosion of the channel banks for example.