

Reconstruction of Geological Outcrops by Photogrammetry from Light and Low-Cost Instrumentation

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SUMMARY

Photogrammetry is a useful imaging processing widely used in Geosciences to reconstruct in 3D outcrops in nature. Nevertheless, because of the very large range of geometrical aspects for geological outcrops as well as the difficulty of access to some field study areas, the photogrammetry can be difficult to be used. In order to be able to reconstruct a very far away and difficult to access outcrop with a high resolution and to extract geometrical measurements from a 3D model, we developed a particular method to applied the photogrammetry in such context of studies in Geosciences. To build our photogrammetric model we only used: 1) a camera to take a total of 5000 pictures at a high resolution. We took the pictures with a methodic protocol to control several parameters as the overlap between photos, the direction of the shooting and the distance from the outcrop; and 2) a laser rangefinder with targets, a compass and a clinometer to be able to generate the scaling and georeferencing for the point clouds by measuring the distances and angles between stations and from stations to targets. Then, we used CoMet, a software for compensation of topographic measurements and network pre-analysis, to calculate the local coordinates of the stations and targets. Finally, we used the software PhotoScan to reconstruct in 3D the photogrammetric model. In order to validate our 3D model, we choose to extract some geometrical data as the orientation of the geological structures that normally consist of planes in the 3D point clouds. Thus, we used qFacets and Ransac, 2 different tools with CloudCompare software to generate and interpolate planes from the point clouds. By a comparing the measurements that we took directly on the field and the extracted data from our 3D model, we obtained very consistent values corresponding to the initial expectations.

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