Doctoral Thesis Title: Optimization of Geodetic and Laser Scanner Solutions for the Monitoring of Deformations over Long Distances

Supervisor/s: Luis García-Asenjo Villamayor y José Luis Lerma García

Abstract:
The monitoring of sand or rock landslides is a matter of special relevance in areas of complex orography near or close to infrastructures and/or population centers. The current trend is the integration of the different available techniques and methodologies, among which are total stations without prism (Tsai, You, Lee, & Chiu, 2012), GNSS techniques (Cina & Piras, 2015), laser scanning (Lerma García, Santana Quintero, Heine, & Van Genechten, 2008), conventional or UAV photogrammetric solutions (Niethammer, James, Rothmund, Travelletti, & Joswig , 2012) or SAR based techniques (Montserrat et al., 2014). However, when the area under study is larger than 1 km^2 or the topography presents great difficulties, the three-dimensional models resulting from this integration tend to present inconsistencies with other high-precision geodetic techniques and, in general, lack uncertainty estimators in accordance with the dimensional metrology standards used in industrial or civil engineering applications.

This doctoral thesis deals with the generation of high precision 3D models by optimizing image-based methods and high precision geodetic techniques for the monitoring of deformations at distances in the range of 1 km (García-Asenjo, et al., 2019). Sources of error such as atmospheric refraction (Baselga, García-Asenjo, & Garrigues, 2014), possible defects in the geometric configuration or inadequate calibration of devices, which degrade the quality of the models from a metric point of view, are tackled through innovative solutions that guarantee the metric quality of the resulting models according to the criteria usually used in geodesy and dimensional metrology, while improving the efficiency of the processes currently employed.

Available Means:
Those belonging to the Department of Cartographic Engineering, Geodesy and Photogrammetry. The doctoral student will be integrated within the framework of the current R+D+i agreement funded by the Diputación de Valencia.

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