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Qualitative comparison of point clouds acquired by LiDAR, SfM, GeoSLAM and Sense 3D for the erosion quantification of a rock wall

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A very important issue in rockfall analysis is to evaluate the rate of rock surface erosion, which is a crucial index to indicate rockfall activities. Over the last 15 years, point clouds datasets for evaluating the rate of rock surface erosion and rock mass structure analysis were mainly acquired by LiDAR and Structure-from-Motion photogrammetry (SfM). More recently, new scanning equipments called GeoSLAM and Sense 3D, easy to carry because their small size/weight and mainly used for 3D reconstruction of object indoors, showed great potential to be applied to extract the topography of a rock outcrop. However, to date no detailed comparative study about the accuracy and density of point clouds acquired by LiDAR, SfM, GeosLAM and Sense 3D has been reported. By using these three last techniques, we first performed an indoor experiment to acquire three different point clouds of a small rectangular box (6.5×4.4×3.7 cm3) placed on a table. The preliminary results show that SfM and Sense 3D models have a higher resolution and point density than the one acquired with GeoSLAM. The second experiment performed outdoor to monitor fast erosion of a molassic rock wall of 3 m-high by 2 m-width using the four techniques. The aim of this work is to find the most suitable method to monitor in fine scale erosion and deformation of rock wall surface to study rock mass degradation.