Geophysical Research Abstracts
Vol. 14, EGU2012-11709, 2012
EGU General Assembly 2012

Semi-automatic discontinuity extraction from rock faces with LIDAR and Photogrammetry. A comparison validated by geotechnical data.

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Detailed geotechnical analysis of discontinuities in rock walls is the basic foundation of many civil and mining engineering projects. It is important to measure and analyse the influence of fractures on rock constructions, such as tunnels, slopes, underground excavations, mines and nuclear waste repositories. The quality of this analysis depends on the detection of discontinuities at different scales and how well they are characterised. Traditional geotechnical surveys require direct access to the observed rock mass. Such surveys are therefore restricted to limited parts of rock masses, due to accessibility and safety reasons, impeding a comprehensive and quantitative analysis of the rock mass. Additionally traditional surveys can be biased by subjective judgment of the surveyor, due to experience, motivation and other personal factors. Remote sensing techniques such as TLS (terrestrial laser scanning) and CRP (close range photogrammetry) not only can deliver detailed and comprehensive geotechnical information of discontinuities in rock walls, but also guarantee higher objectivity. Costs and time can be cut down and comparability of geotechnical surveys will become easier. The International Society of Rock Mechanics (ISRM) defined 10 geotechnical parameters applicable for a quantitative rock wall analysis (Barton, 1978). The orientation (dip & dip direction) of discontinuities is one of them. In this study two rock walls – one located at the Kitzsteinhorn directly below the summit station and the second one at the Gutratberg belonging to the Leube quarry – were studied with the above mentioned non-contact methods to detect the orientation parameter (dip & dip direction). The geotechnical software Split-FX is used to extract this information from the high resolution point clouds. Validation of the gained orientation parameters with onsite geotechnical survey results showed good agreement. A comparison of both methods indicated, that TLS produces more accurate and denser point clouds than CRP. The orientation of the discontinuities sets however is very similar.