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Jack Williams

Department of Geography, Durham University. Email: j.g.williams@durham.ac.uk

Terrestrial Laser Scanning (TLS) has become a frequently used means of characterising change to failing slopes. In order to accurately resolve this change between surfaces, the scale of movement under investigation should be considered relative to the inherent uncertainty in range estimates between scans. In a poster presented at the American Geophysical Union Annual Fall Meeting in San Francisco, two means of reducing epistemic noise in range estimates between scans were presented using data acquired from the high-wall of a large open-pit mine (Figure 1).

Figure 1. The study site was a ca. 65 m high open-pit high-wall

First, novel filtering algorithms were applied to pre-process the data. These included (i) filtering of surfaces with high inclination relative to the scanner using the radiometric return of the laser pulse, and (ii) a means of removing points belonging to edges and holes in the point cloud, which are unreliable in terms of range estimates. Second, a 3D smoothing algorithm was used to reduce noise in the point cloud. Between two scans in which no change occurred change detection using only the raw data yielded only 18% of the scene within the instrument's quoted precision. Filtering and smoothing of the data increased this value to 85% with a loss of only ca. 15% of points from the raw point cloud data. Between two scans in which change occurred, this technique proved useful in reducing overall offset and noise within scan data, without the use of fixed-location targets (Figure 2).

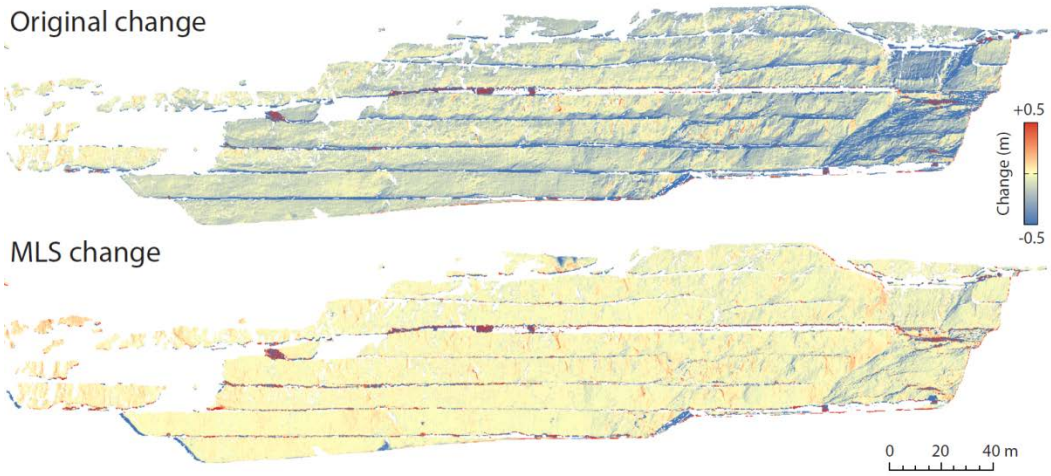

Figure 2. Change over 8 days. Epistemic noise dominates the unprocessed change map. Filters and MLS make small changes (rockfalls / surface wash) more readily identifiable.

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