



A time-lapse lidar survey of the Mam Tor landslide, Derbyshire, UK.

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Since 2004 a terrestrial lidar survey of the Mam Tor landslide in Castleton, Derbyshire, has been undertaken each year. Using a Riegl LMSZ420i laser scanner, the data has been collected during the winter months, while the vegetation is at a minimum, to ensure the surveys record a surface as close to the true geometry of the landslip as possible. These surveys, when combined and viewed in sequence provide an accurate record of the landslides movement over this time.

The main challenge in comparing yearly scans of a progressively moving feature (at up to 500mm/year) is to ensure that each year's scan is in the correct place relative to the others, to this end features outside of the landslip are used as reference points to ensure consistent cross referencing of the landslip scans. In addition to this each year the laser scanner is sited in the same position within the study area, to ensure the same areal coverage over consecutive years.

In-house software called Virtual Reality Geological Studio (VRGS) is used to interpret and analyse the landslip data (in both point cloud and triangulated mesh form), providing tools for comparing surface elevation, but also to tracking individual features (such as individual boulders) from year to year allowing movement vectors to be mapped across the area of the landslip. These vectors can then be compared with other measurements from total-station surveys to act as a check on the validity of the lidar mapping approach. Topographic sections will be shown through several parts of the slip to facilitate year by year comparison.

The landslide itself has formed within the Carboniferous Edale Mudstone Formation, is approximately 900m long, 270 to 300m wide and up to 20m thick. The landslip is estimated to be over 3200 years old.