Identifying rock slope failure precursors using LiDAR for transportation corridor hazard management.

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Identifying rock slope failure precursors using LiDAR for transportation corridor hazard management

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Highlights

- • Analysis of LiDAR data collected over a year preceding a 2600 m^3 rockslide

- • Deformation was observed up to seven months preceding the rockslide.

- • Deformation accelerated before failure.

- • A pattern of rockfalls was observed around the perimeter of the failure.

- • A tension crack progressively developed prior to failure.

Abstract

In the Thompson and Fraser River valleys, rockfall and rockslides are a hazard for railway traffic in the region. In June 2013, a 2600Â m³ rockslide occurred in the White Canyon, causing damage to infrastructure and interruption to service. In the year preceding this failure, the slope was monitored using terrestrial Light Detection And Ranging (LiDAR) as part of the Railway Ground Hazards Research Program initiative. The purpose of this study is to evaluate a hazard management strategy for transportation corridors exposed to steep slopes involving the identification of rockfall precursors prior to significant slope failures. For this failure, deformation was observed in the seven months preceding collapse with an accelerating period occurring in the final 28Â days. A distinct pattern of smaller rockfalls was observed around the perimeter of the deforming rock block as well as loss of surficial material over the slides tension crack. This study shows that with LiDAR monitoring, precursors to rock slope failures can be identified allowing for better rock slope hazard management by focusing attention on areas with the highest probability of failure.

Keywords

Terrestrial LiDAR; Rockslide precursors; Rockslide deformation; Rock slope monitoring; Rockfall hazard

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