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The Fox Valley, on the West Coast of the South Island of New Zealand, is a highly praised destination for tourists wanting to come up close to an alpine glacier and a majestic landscape. It is popular sightseeing spot and one of the main tourist resources, but such a dynamic environment can present several hazards, such as rockfalls. These events in the Fox valley are the results of some incidents, for instance valley deglaciation during the Quaternary and historic oscillation, eventually liberating multi-metric blocks. And one of the most active area where the tourists are concentrated is the Gunbarrel tributary, which threatens the carpark and the walking track.

In order to better understand the rockfall hazards and eventually reduce tourists' vulnerability, the present contribution proposes rockfall modelling using a Digital Surface Model (DSM) acquired by Structure-from-Motion (SfM) photogrammetry using a commercial quadcopter UAV and Terrestrial Laser Scanning (TLS). The model results were then analysed to assess the hazards and potentially the risk of rockfalls by using a GIS software and Flow-R which has been developed at the University of Lausann, Switzerland.

Results have shown that most of the rockfalls are meant to stop in the vicinity of the apron of the Gunbarrel tributary, being less of a threat to the walking track. But as the walking track cannot be placed too low due to potential river surges, which can be generated by glacier terminus collapse, the management remains a delicate issue. A talus formed by a large amount of rockfalls can become debris flow when it contains abundant water because due to rainfall. The model did not account for blocks that jump out of the present catchment and towards the carpark, although recent events in 2016 have shown that such rockfalls had happen. This limitation can be imputed to the model, but most certainly to the limitation of UAV-based DSM, which are difficult to acquire in terrain where the altitude change is ~1000 m, as it is at Gunbarrel. Another limitation to this analysis is the progressive change of the apron, where the accumulation of loose material has been increasing in 2016, due to a large number of debris-flows. The debris-flow fan deposits tend to reduce the slope break at the bottom in the apron, pushing the blocks further in the valley. Regular monitoring and repeats of the modelling are therefore essentials.

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