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Effectiveness of blast-mitigation for rock fall endangered critical infrastructure using terrestrial laser scanning (LIDAR).

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Following a national rock fall risk assessment undertaken by the Swiss Federal Roads Office (FEDRO) a potential rock fall area located above the San Bernardino highway (A13) at Brusei, Canton Graubünden was identified. The rockslope at Brusei was characterized by a previous record of rock fall, large overhanging outcrops and open tension cracks up to 2 metres. Combined with the fact that the A13 is a critical north-south traffic corridor in Switzerland and the geological situation, the Public Works Department of the Canton Graubünden made the decision to mitigate the rock fall risk with the use of explosives.
We report on the use of terrestrial laser scanning for evaluating the effectiveness of mitigation using explosives for the protection of critical infrastructure. Although modern blast mitigation methods allow for accurate control on removed volumes of rock, it is important to calculate how much was actually removed particularly when protection structures, such as rock fall galleries are located in the transit/deposition zone of the blasted area. High resolution laser scanning is an appropriate technology for monitoring the pre- and post blast situation and provides the basis for: 1) Geological investigations for understanding the initial cause of instabilities; 2) Monitoring the formation of potential new instabilities following blast mitigation; and 3) Integration with other spatial monitoring technologies, such as ground-based radar interferometry.