

Young River Landslide Monitoring – New Zealand



A landslide blocking the North Branch of the Young River near Haunted Spur occurred at 4:40 am on 29 August 2007. The landslide occurred in shattered and sheared schist rock adjacent to the Moonlight Fault Zone. The landslide formed a dam 70 m high blocking the valley. Immediately after the landslide occurred water began impounding behind the dam. Water from the impounded lake has now overtopped the dam forming an outflow channel on the downstream face of the dam.

Project Key-Facts:

| | |
|---------------------------|---|
| RIEGL instrument | LMS Z-420i |
| Object of interest | Young River Landslide, Makarora valley in Mount Aspiring National Park, New Zealand |
| Project management | GNS Science, New Zealand, www.gns.cri.nz |

Scanner at work:



Using a tripod-mounted laser scanner, geologist Chris Massey and surveyor Neville Palmer, both of GNS Science, have measured the volume of the landslide at 11 million cubic meters.

The Young River landslide occurred on August 29 and was discovered by a helicopter pilot three weeks later. Seismic waves generated by the landslide were the equivalent of a magnitude 2.9 earthquake, and were recorded by GeoNet seismic instruments in the central South Island.

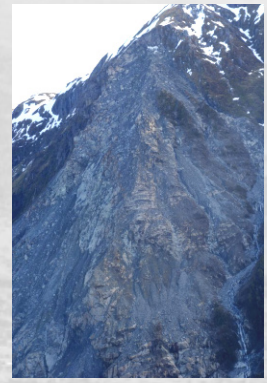
Debris from the slip has completely dammed the North Branch of the Young River, three kilometres upstream of the confluence with the South Branch of the Young. The slip came off what is locally known as Haunted Spur, above the river's true right. The slip initiated at 1500 metres and travelled some 900 metres to the valley floor. The dam it created is thought to be up to 70 metres high. The lake is estimated to be two kilometres in length and 500 metres at its widest point. Water started overtopping the dam on Friday 5 October approximately 5 weeks after formation of the dam. Equipment to remotely monitor the lake level has now been installed by GNS scientists.



situation before landslide



situation after landslide



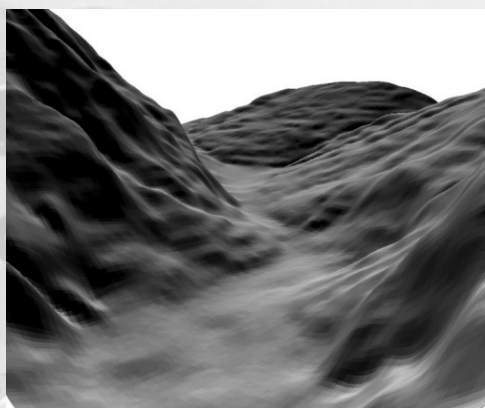
source area of landslide

Details of the landslide and lake from the TLS survey

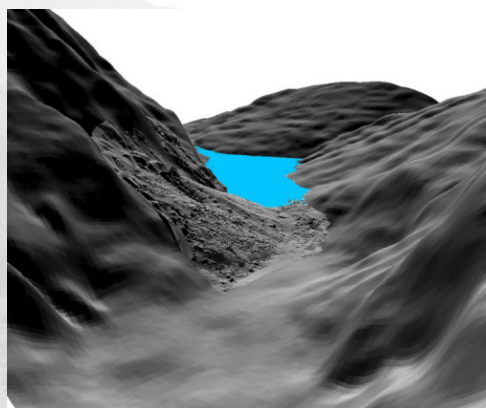
| | |
|---------------------------------|-------------------------|
| Landslide deposit volume | 11 million cubic metres |
| Lake volume | 21 million cubic metres |
| Maximum height of dam | 70 metres |
| Lake width | 500 metres |
| Lake length | 2000 metres |

The terrestrial laser scan (TLS) survey of the landslide dam (deposit) and source area used a RIEGL LMS-Z420i scanner, designed specifically for rapidly acquiring hi-resolution three-dimensional topographic data and images. Surveying from three locations at the dam, Mr Massey and Mr Palmer collected over four million measurements, which have been used to generate a three-dimensional model of the landslide deposit (see accompanying images). This model has been compared with the pre-failure topography, to accurately calculate the landslide and lake volumes. This information has been used by both GNS scientists and emergency management officers at Otago Regional Council and has provided essential information for assessing its future stability as a dam.

The following images show the 3D model before (data derived from the existing topographic Map 260-F38 WILKIN), and after the landslide. The post landslide image is derived from a high-resolution DEM, generated from the Riegl LMS Z420i Laser-survey, integrated into the existing lower-resolution DEM. The right image shows a helicopter, landing on the landslide, for size-comparison.



situation before landslide



situation after landslide



landslide with helicopter for size-comparison



The whole project was realized by GNS Science (www.gns.cri.nz), a Riegl customer in New Zealand



CVS Interactive Ltd. (www.cvs-interactive.co.nz), Riegl's Reseller in New Zealand

RIEGL Laser Measurement Systems GmbH, A-3580 Horn, Austria
Tel.: +43-2982-4211, Fax: +43-2982-4210, E-mail: office@riegl.co.at
RIEGL USA Inc., Orlando, Florida 32819, USA
Tel.: +1-407-248-9927, Fax: +1-407-248-2636, E-mail: info@rieglusa.com
RIEGL Japan Ltd., Tokyo 1640013, Japan
Tel.: +81-3-3382-7340, Fax: +81-3-3382-5843, E-mail: info@riegl-japan.co.jp



RIEGL
LASER MEASUREMENT SYSTEMS