Title:
Long-term investigation of slope failure using photogrammetry method

Authors:
Shusaku Yamazaki*, Katuhito Agui, Toshiyuki Kurahashi

*Civil Engineering Research Institute for cold region (CERI)
1-34 Hiragishi 1-jo 3-chome, Toyohira-ku, Sapporo, 062-8602 JAPAN
TEL +81-11-841-1775, E-mail yamazaki@ceri.go.jp

Abstract:
For road maintenance and slope disaster prevention, it is important to evaluate the stability of unstable rock slope by early and detailed detection of deformation and differences in an unstable slope. In order to evaluate the slope stability, we used a photogrammetric method to generate a three-dimensional topography slope model. This method can generate non-dimensional and non-directional model by just taking multi angle photos using a commercial digital camera. This study targets a steep slope in riverbank that failed at Aug. 2016 with 80-100 m wide and about 80 m high, which mainly consists of pillow lavas of Eocene Sarugawa-formation in Hokkaido, Japan. We took photos in the slope four times over two years after failure to generate topographic model. In the monitoring term, this area had notable events related to slope stability such as heavy rainfall associated with typhoon and large earthquake in Sep. 2018. The generated slope models consist of high-density point cloud of 8-35 million points with 500-2000 point/m2 using 67-82 photo images. As the reference topographic date before the failure, regional low-density (<10 point/m2) point cloud data by airplane laser profiler survey is also used for roughly fitting dimension and direction of the generated models. The result of differentially analysis, between the models and reference, reveals stability of a remaining block in the slope center and progress of small collapse and rock falls around the block during the monitoring term, at sub-meter scale.