

Estimates of slope erosion intensity utilizing terrestrial laser scanning

BULAT USMANOV, OLEG YERMOLAEV & ARTUR GAFUROV

*Kazan Federal University, Department of the Landscape Ecology, Institute of Ecology and Geography,
18 Kremlevskay St., Kazan, Russia, 420008 Kazan, Russia*

busmanof@kpfu.ru, overmol@gmail.com

Abstract Despite the large variety of methods for estimating slope erosion intensity, it is still difficult to obtain accurate erosion rates. Therefore, our goal was to develop a method to provide accurate estimates of sheet and rill erosion intensities, and evaluate denudation quantities due to abrasion, landslides and talus processes using a high-precision laser scanning system (Trimble® GX). Differential maps between all stages of surveying and TIN-models were built directly on point clouds in “Trimble® RealWorks” software. Inspection and cross-section tools were used for detailed study of ground movements on the slope surface and the development of linear erosion forms. A new method for accurate estimates of the erosion has been developed using terrestrial laser scanning techniques. It makes it possible to assess the denudation–accumulation balance on erosive slopes, determine the dynamics of the volume of material moved on different parts of the slope in various surface runoff events, and identify spatial regularities forming rill washouts.

Key words erosion; denudation; abrasion; landslides; laser scanning; TIN-model; cloud of points