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Estimates of slope exogenic processes intensity utilizing terrestrial laser scanning

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Despite the large variety of methods for estimating slope erosion intensity, it is still difficult to obtain accurate slope processes rates. Our report focuses on the development and application of terrestrial laser scanning technique to provide accurate estimates of slope processes intensities, and evaluate denudation quantities due to abrasion, landslides and talus processes. For erosion study, we chose a bare slope at the left bank of Kazanka River (Kazan city). Slope characteristics: average inclination 31.5°, southwestern exposure, average slope length - 18 m, relative excess - 9 m, slope has a linear shape in cross-section. Plot size is 0.07 hectares Study of landslide processes conducted at right bank of Volga River 60 km south from the city of Kazan, where under the action of the Kuibyshev reservoir, landslide processes actively destroys slopes. High-precision terrestrial laser scanning system Trimble® GX used for data collection. Differential maps between all stages of surveying and TIN-models were built in Trimble® RealWorks software. Inspection and cross-section tools were used for ground movements on the slope surface and the development of linear erosion forms detailed study. A new method for accurate estimates of the erosion has been developed. It makes possible to assess denudation-accumulative balance on erosive slopes, determine the dynamics of the volume of material moved in different slope parts in various events of surface runoff, and identify spatial regularities forming rill washouts. During the period of 2013-2014, erosion intensity varied from 0.1 to 13.5 mm, accumulation - from 0.1 to 7.6 mm for a single runoff event. As a result of subannual scanning of different types of landslides a detailed picture of process development obtained.