THE STABILITY ASSESSMENT OF THE "KABARDINKA" LANDSLIDE IN CARBONATE-TERRIGENOUS FLYSCH (WESTERN CAUCASUS, RUSSIA)

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The Caucasus, along with the Pyrenees, the Alps and the Carpathians, is a part of the frontal mountain chains of the Alpine-Himalayan fold-thrust belt, stretching along the southern border of the Eurasian lithosphere plate (Khain, 1998). The Western Caucasus, where the folded carbonate-clastic flysch of Cretaceous-Paleogene age is widespread, is a landslide-prone region where landslides affect from 57-61% to 73-74% of the entire area (Zerkal&Strom, 2017).

The landslide in question is located at the northwestern part of the Western Caucasus, at the Black Sea coast. The north-west facing slope of the Marhotsky Ridge branch is about 1 km long (from the coastline to watershed) and more than 250 m high. It is composed of the terrigenous and carbonaceous flysch – the interbedded sandstone, locally sandy siltstone, carbonate and clayey marl of the Campanian age. Generally, bedding of flysch is close to monoclinal, layers dip at an angle of 15°-35° and stretch diagonally relatively to the general slope’s orientation. During field survey two faults were found in the area – one dipping South-West and one dipping North-East.

This slope is affected by the "Kabardinka" landslide about 3.5 million m3in volume if not more. Its body represents a wedge-like block bounded from top and lateral sides by the narrow furrows separating the displaced mass from the host rock massif. Main body consists of several the carbonate flysch blocks partitioned by wide fissures.

Calculations of the landslide stability was performed using the surface wedges in rock slopes method (Methodology, 1980; Goodman, 1985). The analysis included two stages. On the first stage the kinematic analysis was performed to demonstrate the possibility of the wedge-type block formation. This procedure is known as Markland test (Markland, 1972). The second stage was the calculation of the safety factor that was found to be 1.075. Thus, the slope can be characterized as presently inactive, dormant landslide. However, its state is close to the marginal stability level that can lead to displacements activation under extreme conditions – the abnormal precipitation or earthquake shaking, even if the latter intensity will be relatively low.

Such block slides are typical of the rock massifs composed of the carbonate-terrigenous flysch that underwent folding and faulting. Wedge-like shape of the sliding surface require utilization of the appropriate methods of slope stability assessment. Its modeling using more "standard" cylindrical sliding surface provides inadequate safety factor estimates.