

DEBRIS FLOW AND SLUSHFLOW PHENOMENA IN LOVOZERSKIYE TUNDRY, KOLA PENINSULA, NW RUSSIA

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Lovozerkiye Tundry is a compact plateau-like mountainous massif located in the central part of Kola Peninsula 10 km eastward from the Khibiny Mountains. One of the specific processes of valley development there are slushflows, specific subtype of debris flows. Unlike typical debris flows, these are essentially water-saturated snow masses with limited (commonly <12%) content of clastic material (size up to 1-2 m) occurring in low-order stream channels.

Geomorphic interpretation of high-resolution satellite imagery from public services and 1:50000 topographic maps showed widespread distribution of geomorphic evidences of debris flow phenomena within the massif. Detailed field survey conducted in 2017 generally confirmed these results. Specific landforms and deposits distinguishing active slushflow origination, transit and deposition zones were observed in 22 out of 30 investigated mountain valleys longer than 3 km. Apparently, most of the slushflows in the Lovozerkiye Tundry are originated by rapid snowmelt, possibly added by rainfall, in narrow deep channels in upper reaches of larger basins. In addition, there are also gravitational slushflows localized in steep avalanche tracks starting as wet snow slab failure similar to wet snow avalanches. Typical granular debris flows – with low content of fine material – are possible in, at least, four basins due to periodical occurrence of extreme water discharges from moraine-dammed lakes triggered by avalanches and/or rockfalls into lakes. It has also been found that granular debris flows in lower parts of valleys can be triggered by slushflows in their upper parts. For example, during the 2017 field campaign initial stages and consequences of such a complex event starting as slushflow and continuing as granular debris flow was observed on July 3 in the Sengisjok valley. The following field surveys have established the limits of all morphodynamic zones for further monitoring.

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