



Analysis of landslide overgrowing rates at Vaskiny Dachi key site, Central Yamal, Russia

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An estimation of overgrowing of landslide-affected slopes by vegetation at three main landslide elements: shear surface, landslide body and “frontal zone” at Vaskiny Dachi key site is presented. Vaskiny Dachi key site is located in the watershed of Se-Yakha and Mordy-Yakha rivers on Central Yamal, Russia. The area is represented by highly-dissected alluvial-lacustrine-marine plains and terraces. The closest to Vaskiny Dachi climate station is Marresale, about 90 km southwest of Vaskiny Dachi, at the Kara sea coast. The weather here is probably somewhat cooler than at Vaskiny Dachi. The average annual (summer) air temperature at Marresale is -8.3°C (4.3°C) (“Russia’s Weather” Server). To estimate vegetation cover dynamics on cryogenic landslides at “Vaskiny Dachi”, data published by O.Rebristaya and others (1995) were used. Their observations were done in 1991-1993, and were supplemented by further field observations (Leibman et al., 2000, Khomutov & Leibman 2007) and by field and remote sensing observations in 2008. An estimation of vegetation cover dynamics on cryogenic landslides at “Vaskiny Dachi” leads to the following results. Immediately after landsliding in 1989, landslide shear surface was bare without any vegetation, landslide body had initial vegetation, and “frontal zone” was under liquefied sediment masses. “Frontal zone” formed in front of a landslide body, appears as a result of damming of drainage routes by a landslide body with flooding of the shear surface “upstream” of the landslide body, formation of a sedge-cottongrass meadow there, and swamping downstream (Khomutov & Leibman 2007). By 1993, landslide shear surface got overgrown by species subordinate in surrounding initial landscapes (*Alopecurus alpinus*, *Festuca ovina*, *Calamagrostis neglecta*, *Poa alpigena* ssp. *Alpigena*, etc.). Landslide body was covered by initial communities which got depressed: vitality of *Salix polaris*, *Vaccinium vitis-idaea* was reduced, dead off moss cover and overgrown *Equisetum arvense* ssp. *boreale* were presented, pioneer moss species (*Bryum* sp., *Ceratodon purpureus* appropriate for disturbed habitats appeared. In the “frontal zone” transformed initial communities were observed and sedge communities with *Carex glareosa* were developing (Rebristaya et al. 1995). In 2005 landslide shear surface was characterized by abundance of pioneer grass and chamomile-grass with herb communities on rather dry portions (*Deschampsia borealis*, *Puccinellia sibirica*, *Draba hirta*, *Tanacetum bipinnatum*, *Senecio congestus*), and sedge (*Carex glareosa*, *Carex bigelowii* ssp. *arctisibirica*) or cottongrass (*Eriophorum angustifolium*, *Eriophorum vaginatum*) meadows in depressions, but edges of gentle troughs were overgrowing poorly. On the landslide body, initial moss cover did not recover, on separate blocks crustose lichens developed. However, everywhere in more stable herb-shrub communities with *Salix polaris* typical moss cover formed. In “frontal zone” sedge bogs appeared. Some activation of overgrowing was noted in 2007-2008 in connection with favorable weather conditions with warm summers in preceding 2005-2006 and relatively high summer precipitation, but shear surfaces of majority of landslides got overgrown by 30-40 % because of poorly developed organic horizon and high erosion liability of these surfaces, as well as shear surfaces of small landslides on steep slopes. Different are landslides on gentle southern slopes. Their shear surfaces got overgrown by herb, cotton grass and sedge communities by 90% while communities on landslide bodies are similar to those on surrounding undisturbed slopes. Specific are landslides with actively developing thermoerosion on shear surface. Overgrowing and thermoerosion are developing simultaneously at such landslides. At one of such landslides depth of thermoerosion gully reached to 2 m in 2008. At the same time shear surface around the gully got overgrown by pioneer grass and chamomile-grass communities with *Equisetum* and herbs by 50-100 %. These results serve as a basis for differentiation of landslides occurring at Vaskiny Dachi key site by remote sensing methods.

References:

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