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# Mechanisms and geoecological consequences of cryogenic landslides in the area of marine sedimentation

M. Leibman and N. Ukraintseva

Earth Cryosphere Institute, Russian Academy of Sciences, Siberian Branch, Tyumen-Moscow, Russian Federation (mleibman@online.ru)

Maritime lowlands in the Arctic are often composed of saline marine rocks, preserving their salinity due to perennially frozen state. Active surface processes, such as landslides remove upper washed out soils, to expose saline clayey deposits. Since the exposure, geochemical processes start to develop in a newly formed active layer.
Depending on the triggers of a cryogenic landslide: thawing of the icy layer at the active layer base or melting of massive ground ice, different sliding mechanism may develop: either block movement of the sandy-silty rocks, or creep/flow of liquefied silty-clayey rocks. Each mechanism causes different complex of consequences: geomorphologic, geochemical and geobotanical.
All types of cryogenic landslides are found on Yamal Peninsula, which is composed of saline rocks of various sandy to clayey texture, massive ground ice close to the surface, complicated topography with the area of slopes exceeding that of flat surfaces, and vast area of slopes re-worked by landslides.
Landslide-affected slopes on Yamal underwent several cycles of landslide events after which they obtained a different from surrounding stable slopes appearance. Bare surface is re-vegetating relatively slowly, vegetative complexes differ from those removed, and only possibly after several centuries shrub-moss coverage reaches 100%.
In terms of lithology active layer of landslide-affected slopes is composed of clayey rather than sandy-silty deposits. In terms of geochemistry active layer soils and ground water contain much higher concentration of main ions, though reducing in time, loosing a marine signal and acquiring a continental mode while plants accumulate elements. In terms of geobotany, dwarf shrub moss-lichen tundra is replaced first by grass-lichen tundra and then by willow shrub grass-lichen tundra. Initial exposure of the surface and formation of a concave landform promotes snow accumulation, thermoerosion, water drainage and as a result, active layer deepening, then re-vegetation starts the inverse process.
Classification of cryogenic landslides suggested in this paper is summarizing a 21-year experience of field work in landslide-affected areas of Pleistocene marine sedimentation. Two main types of landslide process are subdivided according to the mechanism and geomorphic effect: cryogenic translational slides and earth/mud flows. Main landforms in the first case are landslide cirques, while in the second case these are thermodenudation cirques.
Soils at a landslide shear surface in landslide cirques have better agrochemical properties compared to the stable surface. Willow shrubs are the main source of biological productivity. They provide long-lasting favorable conditions for the formation of increased biomass. Shear surface of earth/mud flows is renovated very often and vegetation is not restored to 100% coverage until the ice body is exhausted.