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Risks of cryogenic landslide hazards and their impact on humid ecosystems in cold environment

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Abstract

This paper focuses on monitoring of landscapes downgrading in specific conditions of Arctic ecosystems with cold climate conditions (marshes, permafrost, high humidity and moisture). The paper has a special focus on spatiotemporal assessment of land cover types changes in using GIS answering question “what exactly happens with land cover types over time ?” and “how the landscapes located in specific cold-moisture conditions are affected by the landslides”. A specific case study of the current work is cryogenic landslides which are typical for cold environments with permafrost distribution. The research region is located in Yamal Peninsula, north Russia. This work analyses environmental consequences caused by the cryogenic landslides in northern landscapes and overall climate changes affecting sensitive Arctic ecosystems. The thaw of permafrost layer leads to the destruction of the ground soil layer and activates cryogenic landslide processes. After disaster, vegetation coverage needs a long time to recover, due to the sensitivity of the specific northern environment. As a result, land cover types change significantly within the landscapes of the regions affected by the disaster. The application of GIS software was used to analyze and process two satellite images (Landsat TM) taken at different time (1988 and 2011) in order to assess spatiotemporal changes in the land cover types of the Arctic landscapes. This work demonstrates how GIS spatial analysis can be applied to studies of the environmental disasters, as well as monitoring and mapping changes in the landscapes patterns caused by the external factors such as landslide hazards.

Keywords: landslide hazards
