ESSAY OF REVIEW OF TERRITORIAL GEOCRYOLOGICAL HAZARDS ASSESSMENT METHODS

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Hazards and risks assessment of dangerous geocryological processes is actual problem in connection with climate change. Permafrost is widespread in Russia, Canada, the USA (Alaska), China, Mongolia and in mountain regions. Currently there are many papers concerning permafrost-related hazards, but the conceptual and based techniques are not available. Different approaches for solving this problem are considered in the paper.

The technique of geocryological hazards assessment was first recognized by L.N. Khrustalev. The probability, that thermal and mechanical interaction of geologic environment with construction and atmosphere, crosses region boundaries of acceptable state and the quality is lost is so called system fault or risk. The main technique of quantitative risk obtaining remain numerical or method of statistical testing which is called Monte Carlo method. To know the risk probability isn't enough for economic evaluation of territory. For that the cost of risk is necessary which can be obtained using mathematical expectation of damage value. The investigation is doing at large scale.

The zoning map of exist and potential probable vulnerability from different hazard level processes for constructions was made at the geocryology in Lomonosov Moscow State University. The scale of map is small and the analyzed territory is Russia. The qualitative assessment of hazard level of cryogenic processes was done. The most significant kind of processes: thermal subsidence thawing rocks and thermokarst, frost boiling, icing formation, solifluction and slipouts, thermal erosion and thermal abrasion.

The forecast maps of northern territory zoning where permafrost was divided on high, medium and low potential hazard was made in small scale too.

Natural Hazard Mitigation Plans under the Federal Emergency Management Agency are developing in the USA for most cities of Alaska. The risk is evaluated for each borough of Alaska depending on permafrost distribution. Types of ground failure in Alaska include landslides, land subsidence, and failures related to seasonally frozen ground and permafrost. Other natural hazards as erosion, flood, earthquake, wild land fire, severe weather, avalanches and ice override are considered in Alaska.

The purpose of international project "Geologic Hazards Associated with Climate Change" is to publish geologic-hazards information that will be used for proactive planning, mitigation, and emergency response in high-risk communities and developing areas. This information to allow planners and design engineers to minimize the economic impacts and public safety risks associated with geologic hazards.

To conclude the generally accessible techniques of geocryological processes quantitative risk assessment is not available. The problem lies in uncertainty appearing from definition of connection of processes activity and geocryological conditions characteristics under climate change. It is important to solve this problem to provide timely delivery of geological and geophysical information to support pre-disaster hazard mitigation for continued economic growth.

The results of this review will be used to develop new method of geocryological risk assessment for different types of engineering constructions.

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