

Date of Submission	2024.04.19
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IPL Project Annual Report Form 2023

1 January 2023 to 31 December 2023

1. Project Title

Landslides Mechanism and the Subgrade Stability Controlling Measures in Island Permafrost Area (IPL 167)

2. Main Project Fields

Mitigation, Preparedness and Recovery

3. Name of Project leader

Wei Shan

Wei Shan: Northeast Forestry University (NEFU), Harbin, China. Contact: Tel/Fax: +86 (0)451 8219 1477,

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Core members of the Project:

Dr. Ying Guo, Northeast Forestry University, China

Dr. Hua Jiang, Northeast Forestry University, China

Dr. Chunjiao Wang, Northeast Forestry University, China

Dr.Zhaoguang Hu, Northeast Forestry University, China

4. Objectives: (5 lines maximum)

Under the permafrost, landslides and other complex geological conditions investigation, design, construction and monitoring technical of express way expansion project.

5. Study Area: (2 lines maximum)

Bei-Hei Expressway Extension Project K160~K182 Section

6. Project Duration (1 line maximum)

2009.08-2024.12

7. **Report**

1) Progress in the project: (30 lines maximum)

The field monitoring is still continuing, and the survey of permafrost in the road area is basically completed. The high-density electrical method is used to track the speed of permafrost degradation, while the methane emission in the road area is monitored, and the relationship between methane release and permafrost

degradation is studied by comparing the rate of permafrost degradation.

2) Planned future activities or Statement of completion of the Project (15 lines maximum)

The impact of permafrost degradation on highways has been completed.

Road environment change has become a new research hotspot.

3) Beneficiaries of Project for Science, Education and/or Society (15 lines maximum)

Some experts say that the earth has entered the "living in Anthropocene", the environmental change is greatly affected by human life. The Lesswer-Khinggan region happens to be in the key zone of "sensitive change of permafrost", and the accumulation of regional data is extremely necessary for the study of the global "Anthropocene" situation.

4) Results: (15 line maximum, e.g. publications)

Incident

*In 2023, the central state-owned capital operation budget project "Whole process construction management of highway in the permafrost degradation area of Northeast China" was approved by the Department of Finance of the Ministry of Education in 2023.06.19. The project cycle is two years, and the project capital is 12 million yuan.

*Florence, Italy, attended the 6th International Landslide Forum (WLF6), at the opening ceremony of WLF6, the Institute of Cold Region Science and Engineering of NEFU was awarded the title of "Global Center of Excellence for Landslide Risk and Disaster Reduction" for the fourth time.

*The Institute of Cold Region Science and Engineering of NEFU signed a letter of intent to jointly build the "International Joint Laboratory for Permafrost Remote Sensing Data Processing" with the Civil Defense Center of the University of Florence, Italy.

Papers

Hydrological-thermal Coupling Simulation of Silty Clay during Unidirectional Freezing Based on Discrete Element Method[J]. Water.2023, SCI

Student training

Wang Kai – Master's Degree

School: School of Civil Engineering, Northeast Forestry University, Harbin, China

Title: Deformation monitoring analysis and application of Beihei Highway based on time-series InSAR technology

Song Jin - Master's Degree

School: School of Civil Engineering, Northeast Forestry University, Harbin, China

Title: Analysis of high density electrical forward and inverse imaging of highway frozen soil foundation

Yang Xiyi - Master's Degree

School: School of Civil Engineering, Northeast Forestry University, Harbin, China

Title: Study on hydrothermal characteristics and soil particle migration of sand filling subgrade under freeze-thaw cycle