Date of Submission	12 July 2024

IPL Project (IPL-Number) Annual Report Form

Period of activity under report from 1 January 2023 to 31 December 2024

1. Project Number and Title:

Study on catastrophic dynamics and affected area prediction of high altitude and long runout landslides in southeast Tibet

2. Main Project Fields

(1) Targeted Landslides: Mechanisms and Impacts

A. Catastrophic Landslides

B. Disasters threating major infrastructures

(2) Mitigation, Preparedness and Recovery

A. Mitigation and reduction

B. Landslide runout prediction

3. Name of Project Leader

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Core members of the Project: Gonghui Wang, Mingjian Hu, Shuai Zhang, Zhen Guo

4. Objectives (5 lines maximum)

This project aims to clarify the catastrophic dynamics of Long runout landslide with high altitude in Southeast Tibet, to increase the accurate prediction ability for affected area of the landslides, and to improve the capacity of geological disaster reduction.

5. Study Area

The study area is located in the Southeast Tibet (93°E~102°E, 26°N~32°N), where has a precipitous topography and abundant waterpower resources. This area is classified as a mid-high risk area of geo-disaster, with frequent Earthquake activities and intense glacier degradation.

6. Project Duration

The scheduled project duration lasts for five years, from 1 January 2023 to 31 December 2027.

7. Report

1) Progress in the project (30 lines maximum)

During this period, preliminary field investigations were conducted in the study area, especially focusing on four typical long runout landslide with high altitude cases (Yigong Landslide, Tianmogou Landslide, Guxiang Landslide, and Luanshibao Landslide). The digital surface models of the landslide areas with centimetre level accuracy have been established by using oblique aerial photography. Electrical resistivity tomography was carried out on those landslide depositional areas, obtaining the information about the groundwater condition in the landslide deposits. Moreover, deposits and rock samples were collected from the source areas and the movement gullies of the landslides. The above work provided a basic understanding of the landslide characteristics in the study area.

In terms of indoor work, regional researches such as landslide statistics analysis and susceptibility mapping were conducted. There were 59 cases interpreted in the study area, including 38 channel-type landslides and 21 open-type landslides. Pearson correlation analysis of the triggers of landslides was conducted and prediction models for the horizontal runout and mean width of landslides were established using multiple linear regression methods. Besides, ring-shear tests were conducted on the deposit samples to investigate the mechanical properties of sliding materials and the effect of landslide impact loading. Those works helped to reveal the main environmental factors contributing to the landslide disaster in the study area and preliminarily explore the causes of the landslide long-runout.

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

In the next period, further research activities will be conducted on the Content 2 and 3 of the project: Impact response and shear behaviour of eluvial deposits in potential landslide area, long-runout movement behaviour under impact loading effect. More ring-sear tests will be preformed to reveal the strength variation law of the eluvial deposits under different impact loading modes, and to find out the catastrophe dynamics mechanism of strength variation of sliding zone. Analysis on the changes in the trace of landslide movement gully will be made based on the variation in the time-series digital surface model, and large flume test will be carried out to simulate the long-runout movement after impact loading.

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

For science, the project helps solve the scientific problems of how do multiple factors induce the disasters and how does impact loading cause the disasters. For education, the implementation of this project helps strengthened intercollegiate communication between researchers and students from different countries and enhanced the disaster prevention awareness of residents in potential disaster areas. For society, since there are lots of major construction projects planned in this region in order to

make use of the hydropower, this project helps improve the operational safety of those constructions.

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

Representative publications related to this project are shown as follow.

Yan, K., Wang, F., Liu, W., Zhang, B., & Gao, J. (2023). Two long-runout rock avalanches in 2022 and 2020 in an underground coal mining field in Zhijin, China. Landslides, 20(7), 1465-1480.

Wang, F., Chen, Y., & Yan, K. (2023). A destructive mudstone landslide hit a high-speed railway on 15 September 2022 in Xining city, Qinghai province, China.

Yan, K., Wang, F., Fan, G., Liu, Y., Nam, K., & Zhang, B. (2023). The Azijue debris flow induced by rainfall on 30 August 2020 in Ganluo County, Sichuan Province, southwestern China. Landslides, 20(4), 771-788.

Yang, H., Xing, B., He, J., Cheng, Q., & Wang, F. (2023). The kinematic characterization of a rockfall in Zagunao Valley in the eastern margin of the Tibetan Plateau. Landslides, 20(3), 601-614.

Wang, F., Chen, Y., Liu, W., & Gao, J. (2022). Dynamics characteristics and research difficulties of long runout landslide with high altitude in Southeastern Tibet (in Chinese). Journal of Engineering Geology ,30(6), 1831-1841.

Note:

1) If you will change items 2-7 from the proposal, please write the revised content in Red.
2) Please fill and submit this form to ICL Network <icl-network@landslides.org>
3) Reporting year must be one or two years (Maximum).