

IPL Project (IPL-Number) Annual Report Form

**Period of activity under report
from 1 January 2025 to 31 December 2026**

1. Project Number and Title:

IPL-272: Study on catastrophic dynamics and affected area prediction of high altitude and long runout landslides in southeast Tibet

2. Main Project Fields

(1) Technology Development

B. Hazard Mapping, Vulnerability and Risk Assessment

(2) Targeted Landslides: Mechanisms and Impacts

A. Catastrophic Landslides

B. Disasters threatening major infrastructures

(3) Mitigation, Preparedness and Recovery

A. Preparedness

A. Delineation of Susceptible Areas

3. Name of Project Leader

Fawu Wang

Affiliation: Tongji University, China

Telephone: +86 21-65983089

Email: wangfw@tongji.edu.cn

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

4. Objectives (5 lines maximum)

This project aims to investigate the disaster-forming environment and triggering factors of Long runout landslide with high altitude in southeastern Tibet, with the goal of improving the accuracy of impact area prediction and enhancing the susceptibility assessment of landslide-related geological hazards.

5. Study Area

This project aims to clarify the hazard-forming environment of high-elevation long-runout landslides in southeast Tibet, to delineate landslide-prone areas and improve landslide prediction capability, thereby enhancing geohazard mitigation capacity.

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, Dingqing Landslide, and Buze 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. Through high-resolution remote sensing image interpretation, GIS-based spatial analysis, and statistical methods, a total of 51 high-elevation ancient landslides were identified within Linka Township, Basu County in southeast Tibet, among which 50 are large-scale landslides. This reveals the disaster-forming mechanisms of large high-elevation ancient landslides in the region. The study focuses on the influence patterns of internal and external driving forces on geological hazards in southeast Tibet. Based on the characteristics of the regional disaster-forming environment, it distinguishes between long-term preparatory mechanisms and short-term triggering mechanisms associated with internal geodynamic processes (such as fault activity and earthquakes) and external processes (such as climate and river dynamics). The results clarify that internal forces play a dominant role over large spatial and temporal scales, whereas external forces act as primary triggers over smaller spatial and temporal scales. 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.

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

In the next stage, further research will be conducted on Tasks 1 and 2 of the project. This study aims to systematically identify the disaster-forming environment and triggering factors of long runout landslide with high altitude in southeastern Tibet, and to establish a multi-source data-driven landslide susceptibility assessment framework. First, based on multi-source remote sensing data (such as optical imagery and InSAR), regional-scale landslide interpretation and deformation monitoring will be carried out to extract key conditioning factors. Second, laboratory experiments

will be conducted to investigate the mechanical properties and failure mechanisms of landslide materials. Representative soil samples from typical landslides will be selected for ring shear tests to obtain residual shear strength parameters (e.g., cohesion and internal friction angle). In addition, centrifuge model tests will be performed to simulate the deformation and failure processes of long runout landslide with high altitude under different stress paths and rainfall conditions, thereby elucidating their evolution mechanisms from both microscopic and macroscopic perspectives. On this basis, a multi-source database integrating remote sensing interpretation results and experimental parameters will be constructed, and artificial intelligence algorithms will be introduced for landslide susceptibility assessment and spatial prediction.

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

For science, this project helps address key questions regarding how multiple factors interact to trigger hazards and how to evaluate landslide susceptibility. 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.

Liu, W., Li, S., & Wang, F. (2026). Two types of erosion caused by the 2000 Yigong long-runout landslide and their impact on the evolution of the Zhamunong Valley from a quantitative geomorphic perspective. *Landslides*, 23(3), 883-897.

Fu, Z., Wang, F., Tu, Z., Peng, X., Liu, G. & Catani, F. (2026). LSDSAM: Harnessing Visual Foundation Model and Enhanced Transfer Learning Towards Practical Landslide Detection in Few-shot Scenarios. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*.

Sheng, P., Wang, F., Chen, Y., Zhang, B. & Feng, Y. (2026). Instability precursors of Liangshui landslide detected by integrating InSAR and DIC technologies. *Landslides*, 22, 3249–3262.

Zhang, B., Wang, F., Sheng, P., You, Q., Feng, Y., Li, S. & Cao, S. (2025). Research Progress on the Influence Patterns of Endogenic and Exogenic Dynamics on Geological Hazards in Southeastern Tibet Plateau. *Earth Science*, 1-34.

Ma, H., Wang, F., Hu, M., Mo X., Fu Z., Zhang, Y., You, Q. & Cao, S. (2025). Forming Conditions and Failure Mechanism of Clustered High-Position Ancient Landslides in Linka Township, Basu County, Tibet Autonomous Region, China. *Earth Science*, 1-8.

Note:

- 1) If you will change items 2-6 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).