Progress in Landslide Research and Technology, Volume 1 Issue 2

A Guided Tour of a New Platform for Global Progress

A large-scale rapid landslide was induced by the mainshock of the 2016 Kumamoto Earthquake. The landslide hit the Aso-Ohashi Bridge on the national road... and it disappeared. (Source: Kyushu Regional Development Bureau, Japan)

ICL International Consortium on Landslides

Springer

NotebookLM

A Global Platform for a Global Challenge

The Progress in Landslide Research and Technology (P-LRT) series is the open access platform of the International Consortium on Landslides (ICL). Its mission is to disseminate recent progress in landslide research and technology for practical applications and the benefit of society.

> **“A common platform for... practical applications and the benefit of society contributing to the Kyoto Landslide Commitment 2020... and the 2030 Agenda Sustainable Development Goals.”**

SUPPORTING GLOBAL FRAMEWORKS

- **Kyoto Landslide Commitment 2020 (KLC2020)**
- **Sendai Framework for Disaster Risk Reduction 2015–2030**
- **2030 UN Sustainable Development Goals**
- **The New Urban Agenda & The Paris Climate Agreement**

Inside This Issue: A Blueprint for Knowledge Sharing

Original Articles

Reporting new progress in research and technology.

Review Articles

Integrating findings from a specific thematic area.

IPL/WCoE/KLC Activities

Progress reports from the International Programme on Landslides and World Centres of Excellence.

Teaching Tools with Online Extras

User-friendly tools with videos, manuals, and illustrations to bridge the gap between science and between science and practice.

Technical Notes & Case Studies

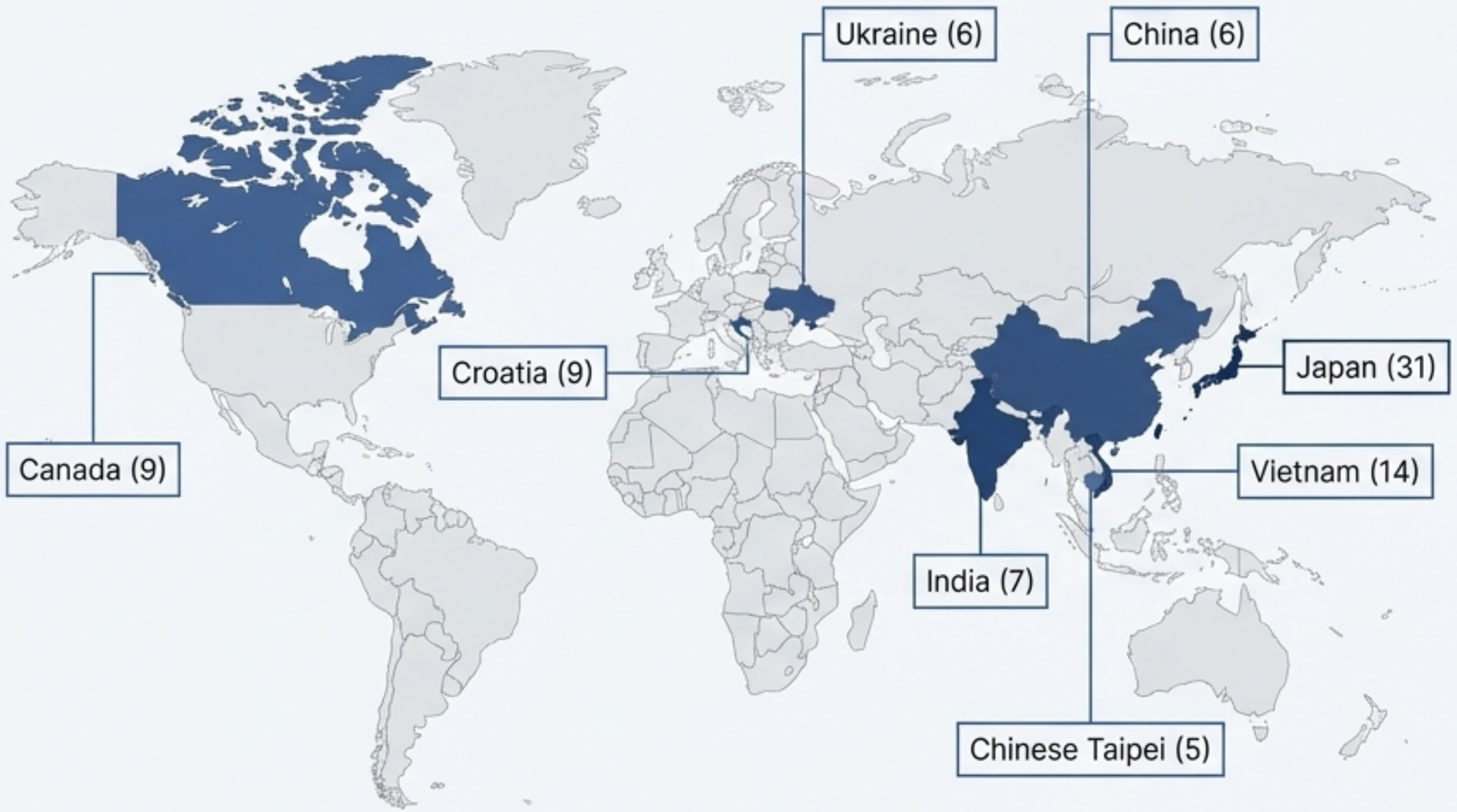
Focused reports on specific landslide events and risk reduction practices.

World Landslide Reports

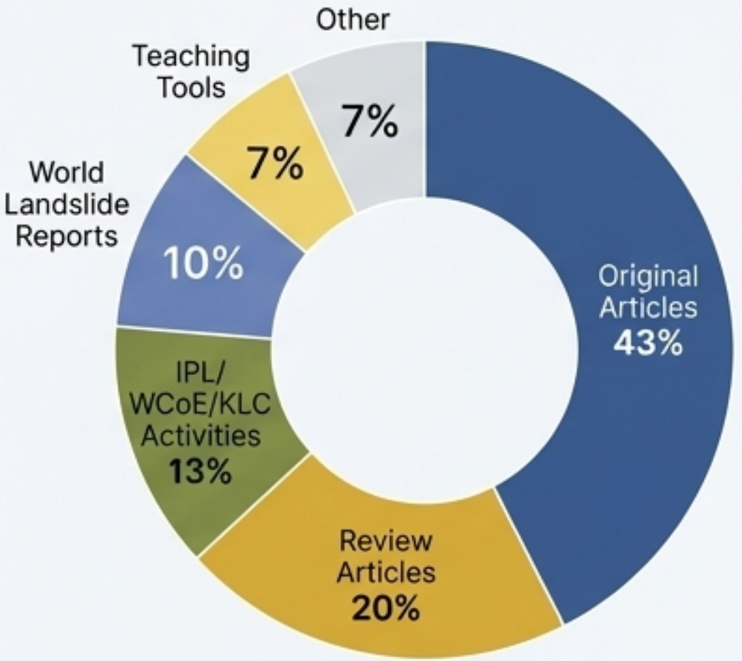
In-depth reports from landslide-prone developing countries.

This structure ensures a comprehensive resource that moves from foundational science to practical, on-the-ground application—all fully open access.

A Global Collaboration: The Minds Behind Volume 1, Issue 2



Article Mix at a Glance



This issue brings together 102 experts from 18 countries, creating a rich and diverse collection of knowledge that reflects the truly global nature of landslide risk and research.

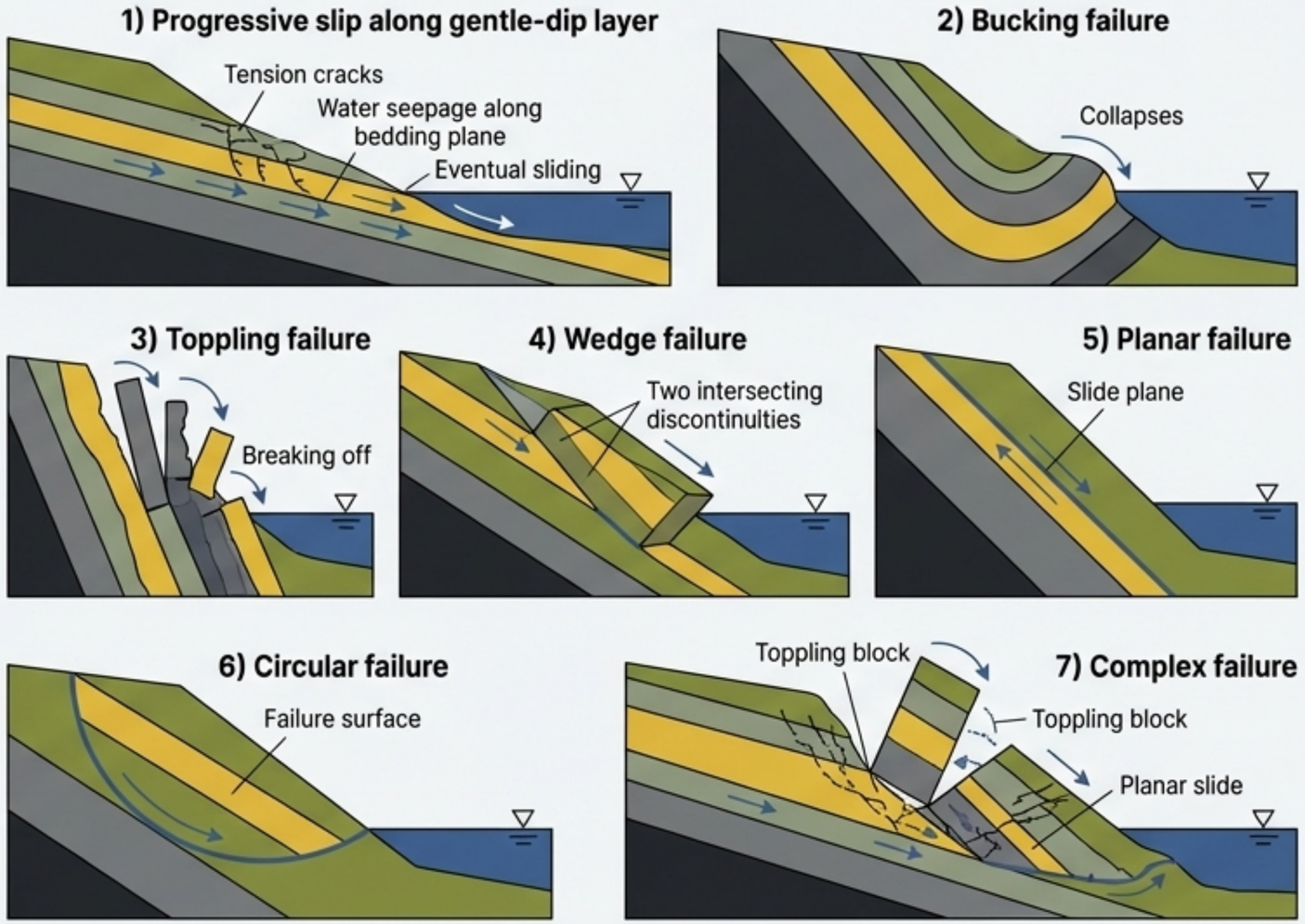
Feature: Engineering for Prevention | Key Techniques for Reservoir Landslides

Key Techniques of Prevention and Control for Reservoir Landslides Based on Evolutionary Process (Tang, Wang, Li, Zou)

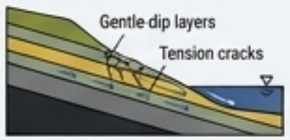
The research argues that effective **landslide control must be tailored** to its specific **"evolutionary process."** Generic solutions often fail because they ignore how a slope is changing over time.

"The essence of reservoir landslide control is to change its evolution process. The effectiveness and long-term safety of... control measures that ignore this process are hard to guarantee."

Seven Evolution Modes of Reservoir Rock Landslides



A Framework for Action: Matching Control Measures to **Evolutionary Stage**



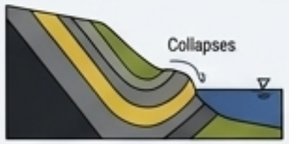
Progressive Slip

→ **Stage I:** Leading Edge Unloading

→ **Recommended Action:** Surface Drainage

→ **Stage III:** Sliding Surface Penetration

→ **Recommended Action:** Anchor Cable Support / Stabilizing Piles



Bucking Failure

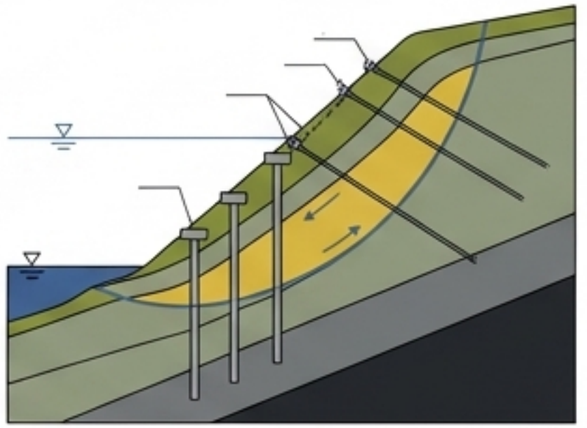
→ **Stage I:** Slight Bending

→ **Recommended** Surface Drainage

→ **Stage III:** Collapse Slip

→ **Recommended Action:** Slope Excavation / Stabilizing Pile

Case Study: Hongshibao Landslide

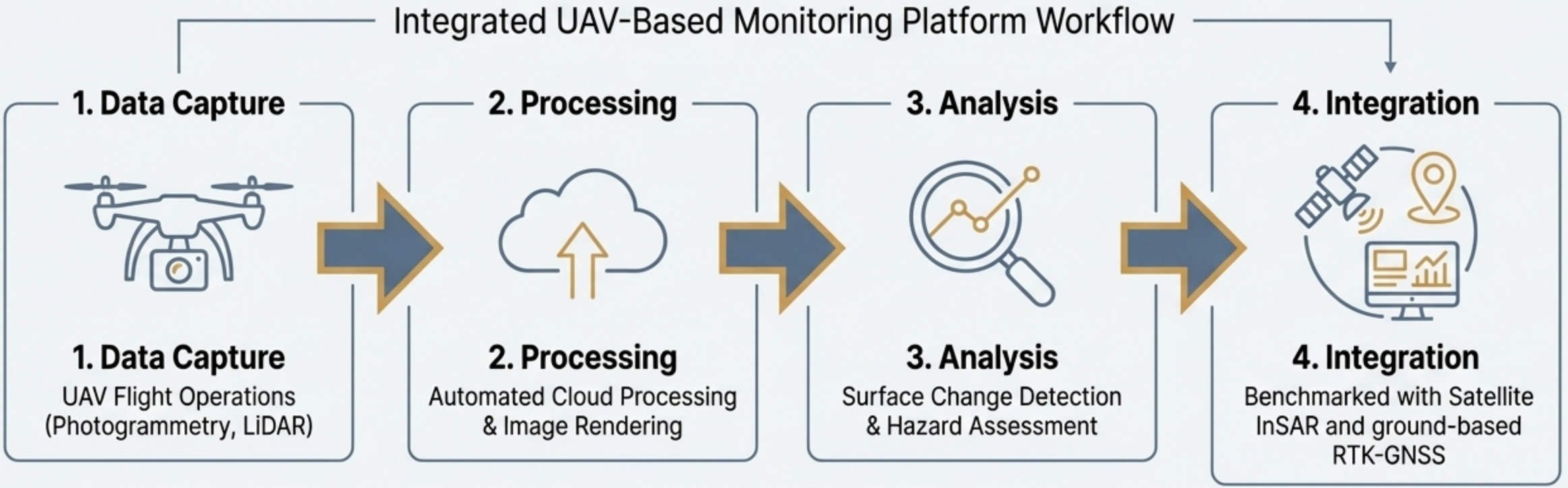


Highlights the successful use of cantilever and anchor piles based on this evolutionary approach.

The research provides a practical decision-making framework, enabling engineers to select the most effective control measures for a landslide's specific condition.

Feature: The View from Above | A Scalable Platform for UAV-Based Monitoring

Scalable Platform for UAV Flight Operations, Data Capture, Cloud Processing and Image Rendering of Landslide Hazards... (Huntley et al.)



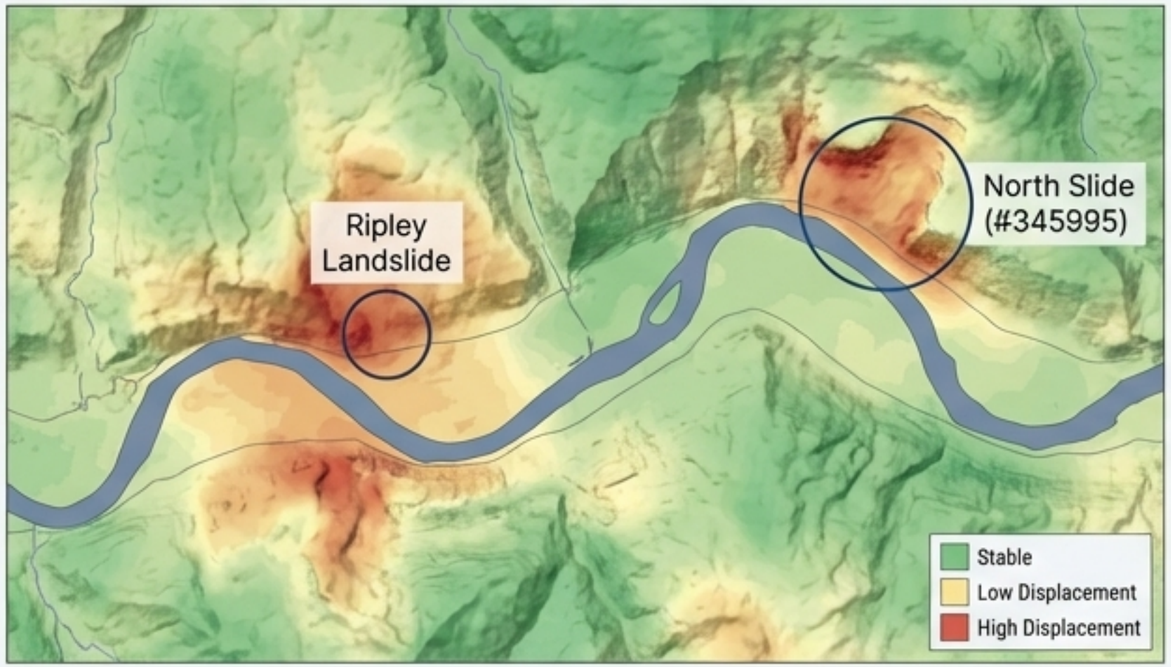
The paper details a streamlined, scalable platform for using Remote Piloted Aircraft Systems (RPAS/UAVs) to inventory and monitor slow-moving landslides with high precision.

The platform combines UAV photogrammetry with satellite radar interferometry (InSAR) and ground-based GPS (RTK-GNSS) to provide rapid, cm-scale monitoring of landslide distribution, morphology, and activity over time.

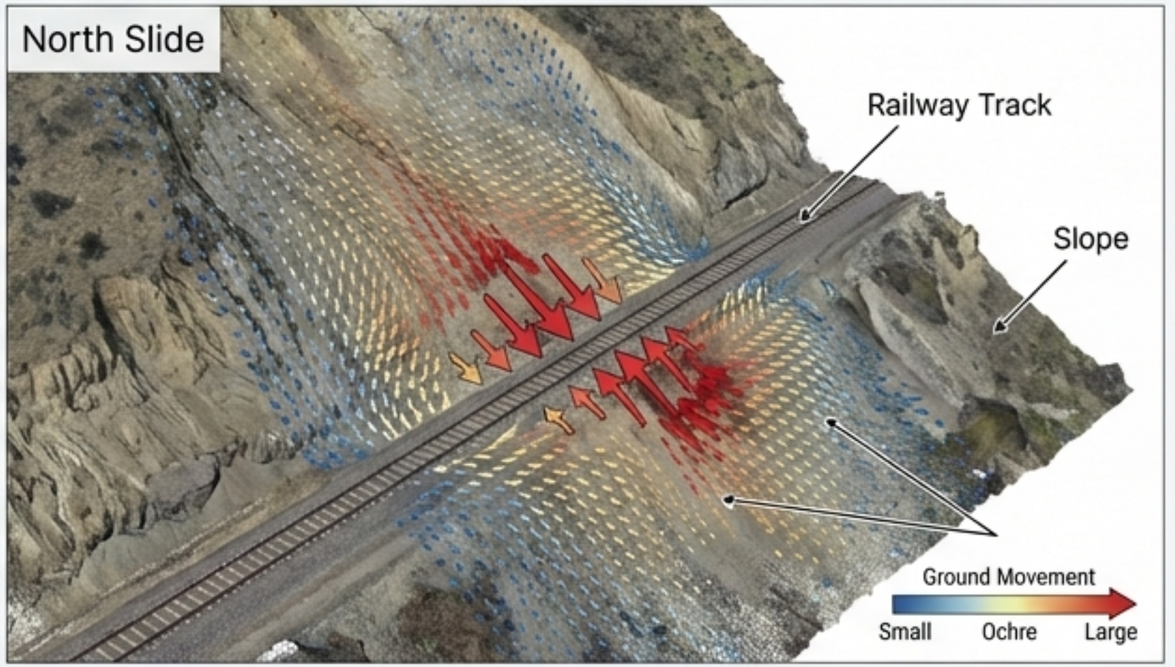
In Action: Protecting Canada's National Railway Corridor

The platform was deployed in the Thompson River Valley, British Columbia, where slow-moving landslides threaten a critical railway network.

Regional Displacement Map (InSAR)



Site-Specific Change Detection (UAV Point Cloud)



Key Result: The system successfully identified regions of highest landslide activity intersecting with railway infrastructure, with monitoring providing cm-scale precision and accuracy.

Key Takeaway: This platform delivers high-resolution, actionable data, moving from regional hazard identification to cm-scale monitoring of critical assets.

Feature: Learning from Disaster | A Decade of Geo-disasters in Kyushu, Japan

Challenges and Lessons Learned from Heavy Rainfall-Induced Geo-disasters Over the Last Decade in Kyushu Island, Japan (Yasufuku & Alowiasy)

An analysis of the devastating July 2017 Northern Kyushu heavy rainfall, which triggered widespread mudflows, debris flows, and landslides, causing severe damage to lives and property.

UNPRECEDENTED RAINFALL

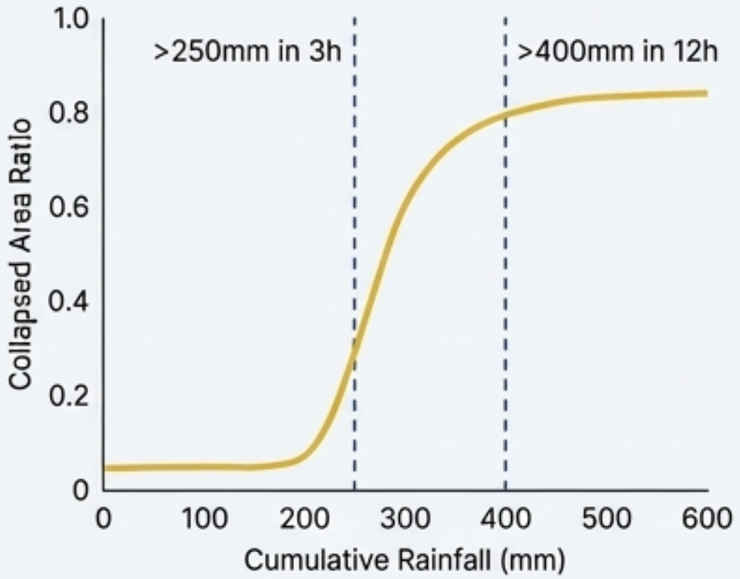
The storm delivered a 12-hour cumulative precipitation of **549.5 mm**, far exceeding previous records and triggering simultaneous slope failures across the region.

> “The historical maximum cumulative rainfall...was unprecedented...The intense rainfall lasted 9 h and is considered one of the most devastating records.”

From Data to Understanding: Identifying Regional Failure Patterns

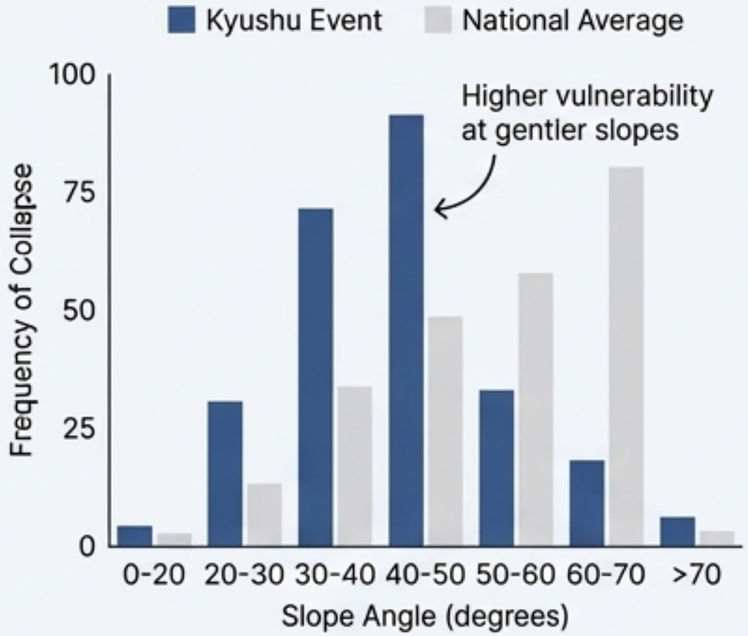
Rainfall Thresholds

The collapsed area ratio increases rapidly when precipitation exceeds key thresholds.



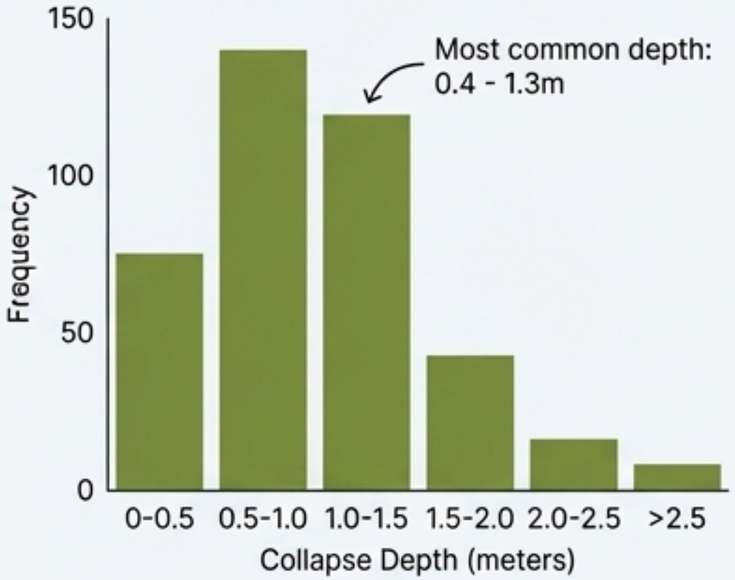
Topographical Susceptibility

A unique feature of this region is the vulnerability of gentler slopes.



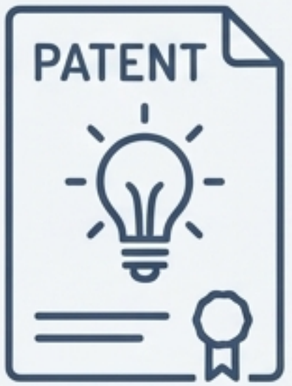
Failure Depth

The majority of failures were shallow.



Detailed post-disaster analysis reveals unique regional thresholds and failure patterns, providing crucial data for updating risk models and prevention strategies.

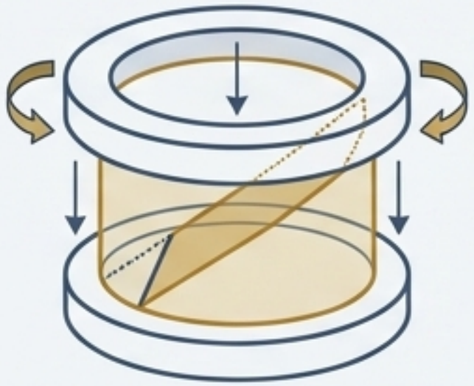
Also in This Issue: A Glimpse into Further Research



Innovation Trends

Landslide Research and Technology in Patent Documents (Mikoš)

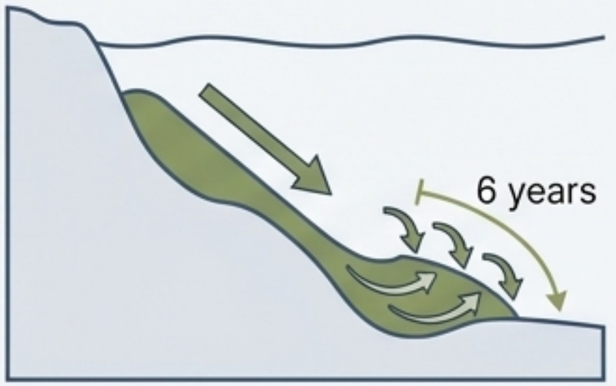
An analysis of over 5,000 patent documents reveals China, Japan, and South Korea are leading innovation in landslide-related technology, with a focus on physics and fixed constructions.



Simulating Creep Failure

Experimental Simulation of Landslide Creep in Ring Shear Machine (Bhandary)

A modified ring shear machine helps define 'critical displacement'—the specific amount of movement required to trigger tertiary creep failure in clayey materials at the residual state.



Protecting Global Heritage

Ongoing Persistent Slope Failures at the Toe of a Giant Submarine Slide in the Ryukyu Trench... (Kawamura et al.)

Analysis of the source of the AD 1771 Meiwa Tsunami reveals that small submarine slides are occurring persistently at the site with a recurrence interval of ~6 years, indicating ongoing instability.

Powered by a Global Coalition

The Kyoto Landslide Commitment 2020 (KLC2020) and the P-LRT series are driven by the International Consortium on Landslides (ICL) and supported by a worldwide network of official promoters.

Supporting UN Organizations

unesco

UNDRR
United Nations Office for Disaster Risk Reduction

WMO

Food and Agriculture Organization of the United Nations

International Unions & Associations

IUGS
INTERNATIONAL UNION OF GEOLOGICAL SCIENCES

IUGG
International Union of Geodesy and Geophysics

IECO
OFIERTA

WORLD INTERNATIONAL UNIDN GF GEODESY AND GEOPHYSICS

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GeoRadar s.r.l.

OPU

Kiso-Jiban Consultants Co., Ltd.

A New Open-Access Resource for a Safer Future

Progress in Landslide Research and Technology is designed for impact. As an open-access publication under a Creative Commons license, its articles are freely available and written to be user-friendly for practitioners, policymakers, and stakeholders who apply advanced knowledge to reduce landslide disaster risk.

CALL TO ACTION

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CONTRIBUTE: Advance the global effort by submitting your own research.

URL: https://doi.org/10.1007/978-3-031-18471-0