

25.22 Hazard and Risk Commission – Report 2025

- Membership

The following people are the current steering committee members.

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URL of the website of the commission:

http://oguchaylab.csis.u-tokyo.ac.jp/IGU_Hazard/index.html

The website is currently operative and continuously updated

There are 163 corresponding members. The members are from the following countries (number of people in parentheses): Argentina (1), Bangladesh (2), Belize (1), Brazil (1), Cameroon (1), Chile (2), China (41), China (HK) (1), Fiji (1), France (3), Germany (2), Greece (2), India (28), Indonesia (2), Iran (3), Iraq (1), Israel (1), Italy (4), Japan (25), Kuwait (1), Mexico (1), Myanmar (1), Nepal (1), Oman (1), Philippines (1), Poland (2), Portugal (1), Romania (4), Russia (2), Singapore (2), Slovenia (1), Spain (1), Taiwan (5), Turkey (2), UK (2), USA (13), and Vietnam (1).

- Meetings

Supporting the International Association of Geomorphologists (IAG) Regional Conference on Geomorphology themed: “Geomorphology for society: challenges and opportunities” held in Timisoara, Romania, on September 16 – 18, 2025. The commission contributed with two sessions:

TS9. GEOMORPHOLOGICAL HAZARDS AND RISK MANAGEMENT (co-organized, IAG IAGGeomHaz WG – International Geographical Union, Commission on Hazard and Risk) - Co-chaired by Susana da Silva Pereira, Maria Carolina Villaça Gomes, and Takashi Oguchi - commission member.

Description: geomorphological hazards are increasing in many regions, causing human and economic losses, and considerable changes in landscape forms and dynamics. These processes occur in complex environments at different scales. This session invites submissions focusing on research, empirical studies, data collection methods, methodological novelties or observations that present innovative research and case studies based on complex morphological processes (pluvial, fluvial, gravitational, hydrogeomorphological, pedological, earthquakes and volcanic processes). We expect to discuss how these studies can contribute to adequately estimating susceptibility, vulnerability, and risk to forward natural hazard research and reduce adverse effects on society.

Takashi Oguchi delivered the talk entitled: “Research projects to analyze and compare landslides in Japan, Romania, and Italy”



Commission member Takashi Oguchi presenting at the International Association of Geomorphologists (IAG) Regional Conference on Geomorphology - Timisoara, Romania, on September 16 – 18

TS14. LANDSLIDES IN CLIMATE CHANGE CIRCUMSTANCES (co-organized IAG-International Consortium on Landslides- International Geographical Union, Commission on Hazard and Risk) Co-chaired by Zeljko Arbanas, Veronica Tofani, Alessandro Mondini – commission chair- Mihai Micu.

Description: landslides, one of the World's major hazards, are among the geomorphological process with great impact on landforms changes. Their main triggering factors are rainfall and earthquakes. In global climate change circumstances, rainfall induced landslides behave differently from the usual patterns and numerous landslides mechanisms and types changes are expected. There are evident changes in the duration of rainfall events, intensities and durations; number of annual rainy days; snow height and melting periods, yearly temperature distribution and consequent evaporation. This session will highlight these impacts on the landslide science and research, from landslide initiation to landslide susceptibility, hazard and risk assessment.

Both sessions had four slots. The papers presented in our session covered various aspects of geohazards, and risk issues. A few talks also included aspects related to social science. Active discussions followed each presentation, particularly in relation to models obtained using non-representative data.

Supporting the organization of the 11th International Conference on Geomorphology.

The meeting will be held in Christchurch, New Zealand, 2 - 6 February 2026.



Two members of the commission, Oded Katz and Alessandro Mondini, proposed the scientific session “Addressing Uncertainties in Landslide Prediction Across Spatial and Temporal Scales” which was accepted.

Description: As landscapes evolve under the influence of natural forces and human activities, the potential for hazards such as landslides increases, particularly in regions undergoing rapid environmental change. Landslides are complex phenomena influenced by various interacting factors, including geological, climatic, and anthropogenic processes. This complexity introduces significant uncertainties in forecasting, making landslide prediction a challenge that requires multidisciplinary approaches combining scientific rigour with practical applications. This proposed session explores advances in probabilistic, machine learning-based, and physics-based landslide forecasting, focusing on how these techniques manage and convey uncertainty at

different spatial and temporal scales. Emphasis will be placed on multiscale methods that bridge local, regional, and global perspectives, highlighting approaches that quantify uncertainties to improve the robustness and reliability of predictions. The session will also examine the implications of uncertainty in forecasting for understanding and mitigating landslide-related risks, as well as for communicating with stakeholders. We invite papers that present innovative strategies to address uncertainty in landslide forecasting, including probabilistic models, data-driven techniques, and validation frameworks for risk reduction. The session will provide a platform for discussing the current state of landslide forecasting, challenges in implementing reliable prediction models, and future directions for enhancing both accuracy and transparency in hazard assessments. The session is proposed by the Hazard and Risk International Geographical Union Commission.

Supporting the organization of the IRC 2026 Regional Conference -
The meeting will be held in Istanbul, Turkey, 17-21 August 2026.



Two members of the commission, Martina Calovi and Alessandro Mondini, proposed the scientific session “Compound Weather-Related Hazards in a Changing World: geographical spatio-temporal analysis” which was accepted.

Description: Scholars agree that extreme weather events are increasing in frequency, duration, and severity all over the world. A combination of such extreme events can aggravate the damage by cascading individual extreme events, resulting in compound hazards. Understanding, detecting, attributing, establishing causality, and forecasting compound hazards require interdisciplinary efforts across scientific domains. In recent years research on compound events has gained increasing attention, ultimately becoming a rapidly developing research field at the intersection of geoscience, climate science and statistics. The increasing occurrence of record-breaking multivariate extreme weather events underscores the urgent need to enhance our scientific understanding and modelling capabilities.

This session will showcase recent cutting-edge approaches for the study of weather-related compound hazards, focusing on improvement of detection methods, prediction under climate change scenarios, and innovative approaches for observation and visualization. This session aims to advance the scientific community’s understanding of the processes and dynamic linkages

underlying various types of compound extremes. Interest is posed to the development and/or application of statistical methods and machine learning techniques for efficiently examining compound extremes, and on quantifying the risks under uncertainty these events pose in both present and future climate contexts.

We welcome contributions from researchers, practitioners, policymakers, and interdisciplinary teams working at the intersection of geography, geoscience, climate science, environmental policy, and artificial intelligence. Submissions may include innovative solutions, theoretical advancements, practical applications, and case studies that demonstrate the integration of AI for the study of compound hazard events. We also welcome critical reflections on the challenges of applying such methodologies in this field, including concerns around data quality, interpretability, ethical considerations, and policy implications.

Supporting the organization of the International conference on “Ecosystem restoration, disaster risk reduction and resilient society in changing climate” that will be held in India at the Department of Geography, the University of Burdwan, the 30 January – 1 February 2026.

Two members of the commission, Takashi Oguchi and Alessandro Mondini are member of the International Scientific Advisory Committee. A message from the commission will be printed in the Abstract volume. The commission will not attend the conference due to an overlap with the 11th International Conference on Geomorphology in New Zealand

- Other activities

Under the framework of the commission, Paola Cardozo and Alessandro Mondini submitted the proposal “SAOCOM L-band SAR for Fast Detection of Landslides in South America” to the ESA/CONAE Promotion of Utilization and Mission Applications and Science (PUMAS) initiative under Earthnet's Third Party Missions Programme. The proposal is currently under evaluation.

We attended two IGU commission chairs Zoom meetings (21 February and 7 November)

We delivered the course “Machine learning for Image Classification” Perugia – Italy September 2025 at the PhD school of Physics and Geology of the university of Perugia as an outreach activity of the commission:



Machine learning for image classification

Introduction

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September 2025

Future plans

The following future events and collaborations are in progress:

- Attending the 11th International Conference on Geomorphology in Christchurch, New Zealand, 2–6 February 2026.
- Attending the IRC 2026 Regional Conference in Istanbul, Turkey, 17–21 August 2026.
- Possible contribution to the formation of the IGU Task Force on Geospatial Artificial Intelligence (GeoAI).