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AI-empowered landslide disaster management

Lecturer biography: Dr. Fawu Wang is a distingushed professor at the College of Civil Engineering, Tongji University, China, and a Professor Emertius of Shimane University, Japan. Prior to joining Tongji University in 2020, he worked at Shimane University in Japan for 10 years, at Kyoto University in Japan for 6 years, at Kanazawa University in Japan for 4 years, and at Changchun University of Earth Sciences in China for 5 years. He has been working on challenging problems in landslides, such as the mechanism of rapid and long runout landslides, the transformation mechanism from landsliding to flow-sliding, motion prediction of landslides, motion behavior of submarine landslides, and landslides triggered by earthquakes, heavy rainfall, and water impoundment. His primary research interests are to clarify the common mechanisms of landslides initiated by different triggers, and to find a way to predict the occurrence and motion of landslides, for the purpose of landslide disaster mitigation. Currently, his research team is working on the landslide disaster management using artificial intelligence (AI).
In his career on landslide study for about 40 years, he co-authored 2 books, co-edited 7 books, and published more than 100 peer-reviewed scientific papers related to landslides. From 2001, he obtained more than 15 competitive research funds, including Fundamental research grant from Japan Society for Promotion of Science (JSPS), and Key program of the National Natural Science Foundation of China (NSFC).
Besides, he is working as the Director-General of the International Consortium on Geo-disaster Reduction, the Editor-in-Chief of a Springer open access journal: Geoenvironmental Disasters.

Presentation abstract: Landslides are among the most destructive geological hazards worldwide, and their risks are increasing under the combined influence of extreme rainfall, earthquakes, climate change, and human engineering activities. This presentation reviews how artificial intelligence is transforming landslide disaster management by integrating multi-source Earth observation, regional risk assessment, and emerging scientific research paradigms. First, AI supports a full-chain workflow across the pre-event, during-event, and post-event stages of landslides. With satellite, UAV, ground-based, and subsurface observations, AI can improve landslide identification, deformation monitoring, rainfall- and earthquake-related prediction, early warning, and post-disaster mapping. Second, AI enhances regional risk perception by linking susceptibility, hazard, exposure, vulnerability, resilience, and risk into a progressive assessment framework, providing support for zoning control, priority prevention, emergency response, and decision making. Third, new AI paradigms are expanding landslide research from data-driven prediction toward mechanism-aware

analysis and intelligent reasoning. AI for Science, surrogate modeling, generative techniques, digital twins, and knowledge systems offer new possibilities for mechanism discovery, rapid simulation, scenario construction, online updating, and decision support. Overall, AI is shifting landslide research from observation-based interpretation and empirical judgment toward an integrated data-model-reasoning framework. Future development should focus on continuous multi-source monitoring, trustworthy and interpretable models, stronger cross-region generalization, and operational closed-loop systems. With observable data, reliable models, and deployable platforms, AI can become a key infrastructure for intelligent landslide disaster management.