

Editorial

Mountain Glacier Changes and Related Hazards: A Call for Integrated Research

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Mountain glaciers are among the most sensitive indicators of climate change. Their rapid retreat over recent decades has far-reaching implications for climate, water resources, ecosystems, natural hazards, and human safety. As the world launched the first International Year of Glaciers' Preservation Day on 21 March 2025 [1], the scientific community has a timely opportunity to strengthen the case for sustained glacier monitoring, hazard assessment, and transdisciplinary research on cryosphere-related risks.

Mountain glaciers store a substantial share of the Earth's freshwater, yet they are disappearing at accelerating rates. At the same time, the destabilization of glacial and periglacial terrain is increasing the frequency and magnitude of hazardous events in high-mountain environments. Glacier hazard includes glacial lake outburst flood (GLOF), ice/rock avalanche, glacier debris flow, paraglacial landslides/rockfalls, and sometimes surge-induced events. Recent catastrophes in the Himalaya and the Alps underscore the urgency of this research agenda. The October 2023 South Lhonak Lake glacial lake outburst flood in Sikkim, India [2] ranks among the most devastating Himalayan disasters in recent history, and the May 2025 collapse of the Birch Glacier above Blatten in Switzerland's Lötschental Valley [3] revealed once again how glacier-related hazards can cascade into severe loss and disruption.

Mountain glacier shrinkage gives rise to a spectrum of natural hazards that threaten the expanding downstream communities and infrastructure. Despite growing scientific attention, the interplay between climate, glacier dynamics, cryospheric degradation, and hazard cascades remains inadequately understood, particularly under future warming and human activity scenarios. Recent catastrophic events show that glacier shrinkage is not only a cryospheric or geomorphic process; it is also a social and governance challenge [4]. Glacier-related hazards interact with land-use change, population growth, tourism development, and infrastructure expansion, producing risks that extend far beyond the mountains themselves. Effective risk management therefore requires more than physical science alone. It must combine glacier monitoring with social vulnerability assessment, stakeholder engagement, early warning systems, and policy innovation.

This editorial encourages a special thematic topic collection for the journal of *Glaciers* [5], dedicated to mountain glacier change and associated hazards. We would like to publish all types of research articles, including synthesis of current knowledge on the rates, drivers, and spatial patterns of glacier mass loss across major mountain ranges; highlighting advances in monitoring technologies, including remote sensing, in situ observations, and numerical modeling; examining the processes linking glacier retreat to the initiation and evolution of cryospheric hazards; identifying key gaps in hazard assessment, early warning, and risk reduction; and encouraging interdisciplinary and transdisciplinary approaches that bridge glaciology, geomorphology, hydrology, engineering, and the social sciences.



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We particularly welcome studies that combine field measurements, satellite time series, climate projections, and community-based participatory research. We invite researchers, engineers, policymakers, and local communities to contribute to this evolving dialogue. By bringing together original research articles, reviews, and communications, we seek to foster a more integrated understanding of glacier–hazard systems and to support evidence-based adaptation and mitigation strategies.

Conflicts of Interest: The author declares no conflicts of interest.

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Short Biography of Author

Qiao Liu is a full professor at the Institute of Mountain Hazards and Environment, Chinese Academy of Sciences. His research spans mountain glacier dynamics, the hydrology of glacierized systems, and the relationship between these systems and their responses to climate change. He recently focused on geohazards related to glacier changes. He has led more than 20 field expeditions to Mt. Gongga (west Sichuan), Southeast Tibet, the Himalaya, and Karakoram during the past 5 years. Guiding local government and academy institutes installed more than 10 ground observation stations at selected glaciers and glacial lakes in the above mountain regions.

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