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Editorial: Snow and ice disaster: Formation mechanism and control engineering

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Editorial on the Research Topic
Snow and Ice Disaster: Formation Mechanism and Control Engineering

Snow is one of the most active natural elements on Earth. It is an important material source of the polar ice sheet and alpine glaciers. The spatial and temporal distribution and evolution of snow cover profoundly affect the global hydrological cycle, ecosystems, climate evolution, and other natural processes. On the other hand, snow and ice disasters, such as snow avalanches, snowstorms, wind-blown snow, snowmelt floods, building collapses, and traffic hazards, can cause significant damage to human lives and social economies. Thus, studies on the physical processes and formation mechanism of snow and ice disasters, forecasting, and early warning systems, as well as control engineering, are of great significance for preventing snow and ice disasters from damaging society. Research on related disasters involves common scientific problems, such as multi-physical field coupling, strong non-linearity, and multiscale issues, as well as the interaction between atmospheric turbulence and particle flow and other Frontier scientific issues. Additionally, it involves the interdisciplinary convergence of mechanics, civil engineering, atmospheric science, and geography. Therefore, this research has important scientific significance and academic value.

The Research Topic '*Snow and Ice Disaster: Formation Mechanism and Control Engineering*' includes articles that address the importance of mechanistic studies and model predictions on the prevention and control of snow disasters. The articles cover subjects ranging from physical mechanisms to snow disaster engineering, as well as the theoretical physical model that could be applied in future simulation studies and to the forecasting of disasters.

Three papers in this Research Topic are mainly focused on the physical mechanisms of snow and ice disasters. Yu et al. numerically simulated charged saltating snow particles in a static electrical field, Bian et al. conducted a susceptibility assessment of snow

avalanches using a machine learning model, and Dematteis et al. put forward evidence of bedrock forcing on glacier morphodynamics.

Five papers are mainly focused on snow and ice disasters in engineering. Zhang et al. experimentally investigated snow accumulations on rooves based on a new similarity criterion. Liu et al. carried out wind tunnel studies on particle accumulation on the bogie of a high-speed train. Ma et al. investigated snow deposition on railway cuttings during snowdrift. Cao et al. studied the effects of the shear strengths of the ice-roof interface in roof snow sliding. Chen et al. set up a new solver in OpenFOAM for drifting snow and applied it to the forecasting of snow distribution around buildings.

The cryosphere is a key component of the Earth system. The distribution of regional snow/ice cover is mainly affected by factors such as turbulent wind fields, topography, snowfall, and temperature. As global warming continues, extreme weather and climate events will occur more frequently, including snow and ice disasters. Therefore, further studies are needed on the improvement of the snow and ice disaster prediction model and formation mechanism.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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