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Editorial: Large landslides in the Sichuan–Tibet railway: Recognition, mechanism, and mitigation

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Editorial on the Research Topic
Large landslides in Sichuan-Tibet railway: Recognition, mechanism, and mitigation

The geological environment along the Sichuan–Tibet Railway is extremely complex. The terrain is steep, and the neotectonic movement is strong. This region is prone to moderate and strong earthquakes and has been called the "forbidden zone" for railway construction by scholars around the world. The Sichuan–Tibet Railway passes through the high mountains and valleys on the eastern edge of the Qinghai–Tibet Plateau, where large landslides frequently occur (Song et al., 2020; Chen et al., 2021; Yao et al., 2022). These landslides may not only cause significant casualties and property losses but also seriously affect road planning and construction. Affected by plate tectonic movement and the extreme climate, active faults develop in the region, strong earthquakes occur frequently, freeze–thaw and dry–wet cycles are strong, and the formation mechanism of large landslides is complex, making it difficult to effectively prevent and control the risk of large landslides. Therefore, it is one of the greatest scientific challenges for the Sichuan–Tibet Railway to improve the scientific understanding of the evolution process of large landslides while considering the internal and external dynamic coupling effects.

This Research Topic aimed at widening the knowledge on the large landslides by emphasizing interdisciplinary contributions. This Research Topic currently includes five papers, which come from many fields, such as engineering geology, geotechnical engineering, geomorphology, engineering materials, and image processing. Through field investigation and numerical simulation, Wang et al. investigated the causes of debris flow on the slope of the Erlang Mountain Tunnel Management Office. The dynamic process of the debris flow can be divided

into four stages, and the slope shrinkage significantly magnifies the discharge and velocity of the debris flow. In addition, the risk level map provides a reference value for the assessment and prediction of the debris flow. To improve the image processing efficiency of the rock failure area, combined with regional growth segmentation, adaptive threshold segmentation, and global threshold segmentation, Yuan et al. proposed a batch automatic recognition method. The results show that this method can automatically identify many rock cracks and keep the identification accuracy and time in a controllable range. Bi et al. studied the effects of initial water content, soil type, dry density, and desalination on the soil freezing characteristic curve during a freezing–thawing process. The experimental results show that initial water content, desalination, and soil type have great impacts on the soil freezing characteristic curve, while dry density has an insignificant effect on it. In addition to the above articles, the two other articles (Han et al.; Zhang et al.) provided some novel information of other aspects of the large landslides in the Sichuan–Tibet Railway area.

The Sichuan–Tibet Railway area represents a natural laboratory for the study of landslide hazards caused by internal and external dynamic coupling. Landslide disaster mechanisms have been observed on different scales, namely, on the regional, slope, and soil scales. However, integrating and proving the contribution of these mechanisms are still a challenge. Overall, the articles presented in this Research Topic, "*Large Landslides on the Sichuan–Tibet Railway: Recognition, Mechanism, and Mitigation*," provide a valuable source of information concerning the formation causes of large landslides in the Sichuan–Tibet Railway area. We would like to thank all the authors and reviewers who have contributed to this Research Topic, which is not easy but non-etheless interesting and challenging. We hope that this Research Topic can inspire new research methods in the field of landslide disasters in the future.

Author contributions

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

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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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