Editorial: Deep rock mass engineering: Excavation, monitoring, and control

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Editorial on the Research Topic
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With the development of the social economy, the depth of underground excavation has seen a significant increase in the fields of mining, tunnelling, hydropower, nuclear waste deep geological storage, and underground protection engineering. In mining engineering, for instance, nearly 200 metal mines have mining depth of more than 1 km, and the deepest one has reached more than 4 km below the ground surface (Li et al., 2017). The excavation of rocks in deep ground is subjected to the state of complicated circumferential loadings, for example, the high *in situ* stress, the high ground temperature, the high hydraulic pressure (high gas pressure), in addition to the dynamic disturbance caused by blasting and mechanical excavation (Zhang and Zhao 2014; Huang et al.). Therefore, the excavation process may cause rockburst, coal and gas outburst, sudden fracture of rock mass and other dynamic phenomena, and cause severe engineering disasters. Therefore, in deep rock excavation engineering, the description of dynamic disaster response induced by excavation, the exploration of hidden disaster sources, and disaster forecasting and control have become the key technologies.

Within this context, continuous progress needs to be done to improve the safety performance of deep rock excavation. To meet the demand of engineering and academic communities in this topic, a Research Topic "*Deep Rock Mass Engineering: Excavation, Monitoring, and Control*" was proposed to the renowned journal *Frontiers in Earth Science*. The aim of this topic was to call for the state-of-the-art research in deep rock mass excavation, particularly in mining engineering, tunnelling, petroleum (gas) engineering and general rock mechanics, and to pulse the research trend in deep rock engineering.

It was a great honour to be invited to serve as a Guest Editor for this Research Topic. Upon the open of this topic, it was even more privileged to receive so great response from relevant academic communities. In total 21 papers collected and published in this Topic. A wide range of research was presented from novel laboratory testing (e.g., Liu et al.; Zhao

and Niu; Liu et al.), robust numerical modelling (e.g., Hu et al.; Zhang et al.; Zhu et al.) and new development of models (e.g., Huang et al., 2022, Bu et al.) to case studies (e.g., Wu et al.; Li et al.; Liu et al.).

It was hoped that this special topic would serve as a small but thought-provoking collection for the community through the state-of-the-art review, introducing the new technologies in the industry practices and techniques used in the research field as well as insight to the future of deep rock mass engineering.

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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