

# Rock strengthening upon heating - FACT or MYTH?

## Webinar

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**Date & Time: 9<sup>th</sup> October 2020 (Fri), GMT+8 (HKT) 6:30pm**

### ABSTRACT

Most underground projects, such as geothermal energy extraction, nuclear waste repository and underground excavation for deep mining and caverns, are implemented at the depths ranging only from hundreds to thousands of meters where the temperature is far from reaching the high level for the sole operation of the thermal weakening factors. On the contrary, some experimental studies have reported that rock can be strengthened upon heating, rather than weakened in the mild temperature range from room temperature to 200 °C. Despite the profound scientific and practical significance in the geophysical and geological fields, whether rock will be strengthened or weakened in response to elevated temperature is elusive. We carry out a comprehensive literature review and find that the dual effects of three major mechanisms and their interplay may either increase or decrease rock strength in the mild temperature regime. Nevertheless, rock strengthening is more or less an intrinsic property depending on various factors. We also find that there exists a “transition period” at elevated temperatures from rock strengthening to weakening. This discovery is important for underground engineering projects, since the determination of a number of design parameters relies on the laboratory-measured rock strength. Misinterpreted temperature impact on rock strength in an engineering project potentially leads to structural and/or economical failure. For accurate evaluation of rock strength, future laboratory studies should concentrate on the mildly heated rock relevant to the in situ ground conditions.

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### THE SPEAKER

Dr Louis Wong (PhD MIT, BSc HKU) is Associate Professor and Director of MSc in Applied Geosciences in the Department of Earth Sciences at HKU. He has worked in Hong Kong, Singapore and the U.S.A. on a variety of slope engineering and underground construction projects. Dr. Wong has authored and co-authored more than 160 journal and conference publications in engineering geology, rock mechanics and underground engineering. He is one of the 119 HKU scholars ranked in the top 1% worldwide by citations in a research field. Additional to a number of journal and conference paper awards and keynote lectures delivered in international conferences, he was awarded the Richard Wolters' Prize (2014) by the International Association of Engineering Geology and Environment. He has been the Editor-in-Chief of *Bulletin of Engineering Geology and the Environment* (BOEG) since 2018. He is a Technical Assessor on geotechnical testing appointed by the Hong Kong Laboratory Accreditation Scheme (HOKLAS).

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