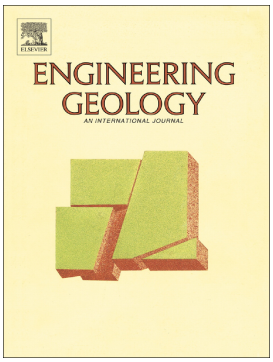

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Technical Note

Low cost colorimetry for assessment of fire damage in rock

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Abstract

Tunnels and caverns excavated for the purpose of mining tend to be designed for short term use and would usually be unlined. Fire hazard within a mining cavern or tunnel poses concerns on the structural integrity of the surrounding rock. Hence, a fast, non-destructive method for assessing the strength of a rock mass after a fire would be useful in deciding whether to salvage a mining operation or to abandon it. Colorimetry as a technique to estimate the heating temperature of concrete has proven useful. However, the use of colorimetry imposes a need to balance ease of use, such as low cost digital cameras and computer scanners, with accuracy achievable with expensive spectrometers and spectrophotometers. This technical note shall investigate the use of a Digital Single Lens Reflex (DSLR) camera and MATLAB as a means of performing non-destructive testing on rocks exposed to temperatures of between 200 ˚C to 500 ˚C to estimate the degradation of the rocks' tensile strength. The CIE L*a*b* color space is used. The effects of soot and smoke on the rocks are also simulated using high temperature grease to mimic real world conditions. The Brazilian tensile strength and P-wave velocity are two other properties investigated in