

Hydraulic fracturing in mines, what does it do to the rock mass behaviour?

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Hydraulic fracturing (HF) started to be used in the oil and gas industry in the first half of the 1900s. The first scientific papers on the subject were published as early as 1947, discussing the mechanism of the fracturing process. Over the years, number of projects both in laboratory and large-scale tests have been executed with the purpose of understanding the fracture propagation in different geological environment, stress state and with already existing fractures. Around the year 2000, HF was introduced into cave mining, primarily as a tool for enhanced caveability, improved fragmentation, and hence to improve productivity in overall changing the behaviour of the rock mass. Over the years the method has also started to be used as a seismic hazard mitigation technique in the deep, higher stressed mines. Various techniques are used for the evaluation of effect of HF on seismic hazard. The most frequently used ones are monitoring the changes in maximum magnitude and analyses of changes in b-value. Studies have also been performed on evaluation of changes in the rock strength, changes in anisotropy in the rock mass, and seismic wave velocity. It is also discussed how to evaluate the seismic response both within as well as outside the hydraulically fractured volumes, which reflects in the rock mass behaviour.