CAVITY DETECTION WITH FULL-WAVEFORM INVERSION AT MOUNT ERZBERG, AUSTRIA

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cavity detection, full-waveform inversion

The detection, and mapping, of subsurface cavities is an important task, primarily because the potential collapse of a cavity poses a hazard to infrastructure and residents. Cavities can be created naturally through chemical erosion. Man-made cavities include tunnels from abandoned mining, old basement structures from demolished buildings, tunnels created for illegal activities, and cavities produced through a nuclear weapon test.

Whether filled with air, or water, the material contrast of a cavity to the surrounding rock, or soil, is typically strong enough to provide a significant signal in many geophysical measurements. The challenge lies in the size-to-depth-ratio of most cavities, which is at, or below, the resolution capacity of most geophyical methods. In this project, we test several geophysical methods for their application potential in an open pit mine at Mt Erzberg, where maps indicate a ~4 m wide tunnel from abandoned subsurface mining in ~25 m depth.

This study focuses on seismic cavity detection with SH reflection seismics and P-SV elastic FWI.

The first stage of our studies is the forward-modelling of synthetic data on a smooth velocity model determining the frequencies and offsets for the acquisition. The acquisition is planned for July 2016, and we intend to present the data and a first analysis of its suitability for our study.