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Seismic velocities from traveltime tomography at the iron ore mine Mt. Erzberg, Austria

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The overall goal of this project is to minimize vibrations from mine blasts through optimized blast array configurations. Among other things, this requires an accurate prediction of seismic wave propagation at the site.
In order to perform a seismic site characterization of the iron ore mine Mt. Erzberg 125 3-component-stations were distributed in a 4 km^2 sized area in and around the mine. During the 4-week-long deployment, 21 small seismic shots and 10 production blasts were recorded.
A low signal to noise ratio, due to small charges, leads to no visible S waves in the seismic shot dataset. In contrary, the large amounts of explosives used in the production blasts provide very good data quality. Yet one production blast consists of an array of several individual shots, which are ignited with a certain time interval in between. Thus creating a spatially extended blasting sequence followed by the fall of the rock mass which can last more than half a second. This adds to the complexity of the deconvolution. Still, S-waves arrivals can be seen in some of the data after the deconvolution.
The P-wave velocity model was obtained from a first arrival traveltime tomography with an eikonal solver using simulr16. Due to the small amount of S-wave observations, the S-wave velocity model was derived from the P-wave velocity model with an empirical relation. An elastic FD code that accounts for topography (“BSIT”) was used to predict seismic wave fields in those models. These simulations can then be used to create blasting patterns that optimize vibrations at certain sensitive targets. (See contribution by Trabi et al.)
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