



Fracture zones or mafic sills: modeling and inversion using seismic waveform tomography at the Forsmark nuclear waste repository, eastern central Sweden.

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The Swedish Nuclear Fuel and Waste Management Company (SKB) has been carrying out extensive studies at the Forsmark nuclear waste repository site in the eastern part of central Sweden since 2002. An important component of the studies has been reflection seismic surveys which are useful for locating and characterizing sites for storage of nuclear waste in the crystalline bedrock. In reflection seismic investigations at a nuclear waste disposal site one of the important targets is locating sub-horizontal to gently dipping reflectors. At the Forsmark site, it is difficult to distinguish fracture zones from mafic sills in the standard reflection seismic processing. However, since mafic sills usually have higher seismic velocity than the fracture zones and the background velocity the two possibilities could be differentiated if we could reconstruct the underground velocity field. Waveform tomography has the potential to perform this reconstruction, that is distinguishing fracture zones from mafic sills at the Forsmark site. In this study we want to test this potential of seismic waveform tomography. First, we generate a limited offset synthetic seismic data set based on the geological information from the Forsmark site, which contains several dipping fracture zones and mafic sills. Then we apply waveform tomography to the synthetic data set in an attempt to reconstruct the velocity model. The results show that it is possible to distinguish the fractures from mafic sills in the reconstructed velocity model. We will also show some preliminary results for the inversion of the real seismic data from the Forsmark site.