



## **Impact of petrophysical experiments on interpretation of 4D seismic data at Ketzin**

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Petrophysical investigations of a CO<sub>2</sub> storage concern relationships between physical properties of rocks and geophysical observations for understanding the behavior of injected CO<sub>2</sub> in a geological formation. In turn 3D seismic time-lapse surveys (4D seismics) are a proven tool for the CO<sub>2</sub> monitoring. At the Ketzin pilot site 3D time-lapse (4D) seismic data were acquired by means of a baseline (pre-injection) survey in 2005 and the monitor surveys in 2009 and 2012. At Ketzin CO<sub>2</sub> was injected in a supercritical state from 2008 to 2013 in a sandstone saline aquifer at a depth of about 650 m. Seismic forward modeling using results of petrophysical experiments on two core samples from the target reservoir suggested that effects of the injected CO<sub>2</sub> on the 4D seismic data are significant. Petrophysical data were used in that modeling in order to reflect changes due to the CO<sub>2</sub> injection in the acoustic parameters of the reservoir. That seismic modeling proved the corresponding observations in the real 4D seismic data (the amplitude change and the time delay) and the petrophysical data were further used for a successful quantitative interpretation of the 4D seismic data at Ketzin. Now new logs containing information about changes in the acoustic parameters of the reservoir due to the CO<sub>2</sub> injection are available from a well drilled in Autumn 2012. These logs can be used to estimate the impact of the petrophysical data on the qualitative and quantitative interpretation of the 4D seismic data at Ketzin. New synthetic seismograms can be computed using the same software and the same wavelet as the old ones apart from the only difference and namely the changes in the input acoustic parameters would not be affected with any petrophysical experiments anymore. Now these changes would be put in computing directly from the new logs. In turn the new modelled changes due to the injection (the amplitude change and the time delay) in the newly computed seismograms would not include any effects of the petrophysical data anymore. Key steps of the quantitative and qualitative interpretation of the 4D seismic data at the Ketzin pilot site must be repeated with these new seismograms. Now the impact of the petrophysical data on the qualitative and quantitative interpretation of the 4D seismic data at Ketzin can be estimated.