Geophysical Research Abstracts
Vol. 16, EGU2014-1922-2, 2014
EGU General Assembly 2014

Forward modeling of 4D seismic response to the CO_2 injection at the Ketzin pilot site with the reflectivity method

Alexandra Ivanova (1), Monika Ivandic (2), Thomas Kempka (1), Magdalena Gil (1), Peter Bergmann (1), and Stefan Lüth (1)

(1) GFZ Potsdam, Potsdam, Germany (aivanova@gfz-potsdam.de), (2) Geophysics, Uppsala University, Uppsala, Sweden

When CO_2 replaces brine as a free gas it is well known to affect the elastic properties of porous media considerably. 3D seismic time-lapse surveys (4D seismics) have proven to be a suitable technique for monitoring of injected CO_2. Forward modeling of a 4D seismic response to the CO_2 fluid substitution in a storage reservoir is an important step in such studies. In order to track the migration of CO_2 at the Ketzin pilot site (Germany), 3D time-lapse seismic data were acquired by means of a baseline (pre-injection) survey in 2005 and the monitor surveys in 2009 and 2012. Results of 4D seismic forward modeling with the reflectivity method suggest that effects of the injected CO_2 on the 4D seismic data at the Ketzin pilot site are significant regarding both seismic amplitudes and time delays. They prove the corresponding observations in the real 4D seismic data at the Ketzin pilot site. However reservoir heterogeneity and seismic resolution, as well as random and coherent seismic noise are negative factors to be considered while the interpretation. In spite of these negative factors, results of 4D seismic forward modeling with the reflectivity method support the conclusion that the injected CO_2 can be monitored at the Ketzin pilot site both qualitatively and quantitatively.