

## Oral Presentations

### Applications in CO<sub>2</sub> and Hydrocarbon Monitoring

#### 01

#### **Combination of constrained resistivity inversion and seismic reflection with an application to 4D imaging of the Ketzin CO<sub>2</sub> storage site, Germany**

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A case study for the combination of geoelectric and seismic processing by means of a structurally constrained inversion approach is presented. Structural constraints are interpreted from the seismic data and integrated into the geoelectric inversion through a local regularization which allows inverted resistivities to behave discontinuously across defined boundaries. This arranges seismic processing and constrained resistivity inversion in a sequential workflow, making the generic assumption that the petrophysical parameters of relevant to each method change across common lithostructural boundaries.

The approach is evaluated using both a numerical example and a real data example from the Ketzin CO<sub>2</sub> pilot storage site, Germany. The latter demonstrates the efficiency of this approach for combining 4D seismic and surface-downhole geoelectric data. In consistence with the synthetic example, the constrained resistivity inversions of the real data produce clearer delineated images along the boundary between the caprock and the CO<sub>2</sub> storage reservoir. Near the CO<sub>2</sub> flooded reservoir, the seismic and geoelectric time lapse anomalies correlate well. At some distance to the downhole electrodes, however, the geoelectric images convey a notably lower resolution in comparison to the corresponding seismic images. Although a northerly direction for the CO<sub>2</sub> migration was initially expected, both methods confirm a rather northwesterly migration trend. The results confirm the relevance of the presented approach for the combination of both methods for geophysical CO<sub>2</sub> storage monitoring.