Geophysical Research Abstracts
Vol. 15, EGU2013-119-1, 2013
EGU General Assembly 2013

Sub-seismic deformation prediction of potential pathways and seismic validation — joint project PROTECT

Jennifer Ziesch (1), Chiara M. Aruffo (2), David C. Tanner (1), Thies Beilecke (1), Charlotte M. Krawczyk (1), and Andreas Henk (2)

(1) Leibniz Institute for Applied Geophysics, Hannover, Germany (jennifer.ziesch@liag-hannover.de), (2) Institute of Applied Geosciences, Technical University Darmstadt, Germany

It is important to determine the nature of communication systems that occur between reservoir and surface in the framework of CO_2 injection. This will allow an estimation of the long-term storage integrity. The onshore Otway Basin in south-western Victoria is the first demonstration of the deep geological storage of CO_2 in Australia. In order to achieve our objective we predict and quantify the distribution and the amount of sub-/seismic strain caused by fault movement in the study area. We present first results of a 3D structural model based on interpretation of a 3D seismic volume. First we interpreted 10 stratigraphic horizons with 30 major faults within a ca. 5 km×8 km×4 s TWT volume and built a 3D geometrical model with triangulated mesh surfaces. Based on this model, we identify a complex system of conjugate normal faults, three of which, within a radius of 5 km around the injection site, reach the uppermost seismically-visible horizon in this seismic volume at around 500 m depth. By retro-deforming stratigraphic volumes along the seismically-visible faults, we determine the accumulated deformation and thus the sub-seismic strain variation around the faults. Depending on lithology, the calculated strain tensors can be used to determine which areas are fractured, as well the orientation of fractures and their density. Our goal is to obtain a better overview of possible fluid migration pathways and communication between reservoir and overburden. This will provide a tool to predict CO_2 leakage and thus to adapt time-dependent monitoring strategies for subsurface storage in general.

Acknowledgement:
This work was sponsored in part by the Australian Commonwealth Government through the Cooperative Research Centre for Greenhouse Gas Technologies (CO_2CRC). PROTECT is funded through the Geotechnologien research programme in Germany (grant 03G0797).