Geophysical Research Abstracts
Vol. 15, EGU2013-2875, 2013
EGU General Assembly 2013

Natural analogues for CO_2 storage sites – analysis of a global dataset

Johannes Miocic, Stuart Gilfillan, Christopher McDermott, and R. Stuart Haszeldine
School of Geosciences, University of Edinburgh, Edinburgh, United Kingdom (johannes.miocic@ed.ac.uk)

Carbon Capture and Storage is the only industrial scale technology currently available to reduce CO_2 emissions from fossil-fuelled power plants and large industrial source to the atmosphere and thus mitigate climate change. CO_2 is captured at the source and transported to subsurface storage sites, such as depleted oil and gas fields or saline aquifers. In order to have an effect on emissions and to be considered safe it is crucial that the amount of CO_2 leaking from storage sites to shallow aquifers or the surface remains very low (<1% over 1000 years). Some process that influence the safety of a reservoir, such as CO_2-rock-brine interactions, can be studied using experiments on both laboratory and field-scale. However, long-term processes such as the development of leakage pathways can only be understood by either predictive modelling or by studying natural CO_2 reservoirs as analogues for long term CO_2 storage sites.

Natural CO_2 reservoirs have similar geological trapping mechanisms as anticipated for CO_2 storage sites and often have held CO_2 for a geological period of time (millions of years) without any indication for leakage. Yet, migration of CO_2 from reservoirs to the surface is also common and evidenced by gas seeps such as springs and soil degassing. We have compiled and analysed a dataset comprising of more than 50 natural CO_2 reservoirs from different settings all around the globe to provide an overview of the factors that are important for the retention of CO_2 in the subsurface and what processes lead to leakage of CO_2 from the reservoir. Initial results indicate that if the reservoir is found to be leaking, CO_2 migration is along faults and not through caprock layers. This indicates that faults act as fluid pathways and play an important role when characterizing a storage site. Additionally, it appears that overpressure of the overburden and the state of CO_2 in the reservoir influence the likelihood of migration and hence the safety of a reservoir.