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# Oxygen isotopes as a tool to quantify reservoir-scale $CO_2$ pore-space saturation

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Structural and residual trapping of carbon dioxide ($CO_2$) are two key mechanisms of secure $CO_2$ storage, an essential component of Carbon Capture and Storage technology [1]. Estimating the amount of $CO_2$ that is trapped by these two mechanisms is a vital requirement for accurately assessing the secure $CO_2$ storage capacity of a formation, but remains a key challenge.

Recent field [2,3] and laboratory experiment studies [4] have shown that simple and relatively inexpensive measurements of oxygen isotope ratios in both the injected $CO_2$ and produced water can provide an assessment of the amount of $CO_2$ that is stored by these processes. These oxygen isotope assessments on samples obtained from observation wells provide results which are comparable to other geophysical techniques.

In this presentation, based on the first comprehensive review of oxygen isotope ratios measured in reservoir waters and $CO_2$ from global $CO_2$ injection projects, we will outline the advantages and potential limitations of using oxygen isotopes to quantify $CO_2$ pore-space saturation. We will further summarise the currently available information on the oxygen isotope composition of captured $CO_2$.

Finally, we identify the potential issues in the use of the oxygen isotope shifts in the reservoir water from baseline conditions to estimate accurate saturations of the pore space with $CO_2$, and suggest how these issues can be reduced or avoided to provide reliable $CO_2$ pore-space saturations on a reservoir scale in future field experiments.

References

[1] Scott et al., (2013) Nature Climate Change, Vol. 3, 105-111 doi:10.1038/nclimate1695
[2] Johnson et al., (2011) Chemical Geology, Vol. 283, 185-193 http://dx.doi.org/10.1016/j.ijggc.2016.06.019
[3] Serno et al., (2016) IJGGC, Vol. 52, 73-83 http://dx.doi.org/10.1016/j.ijggc.2016.06.019
[4] Johnson et al., (2011) Applied Geochemistry, Vol. 26 (7) 1184-1191
http://dx.doi.org/10.1016/j.apgeochem.2011.04.007