

## **Prediction of Fluid-rock Interactions in CCS Fields – An Integrated Approach Using Basin Modeling and Geochemistry**

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### **ABSTRACT**

The long-term integrity of geological CO<sub>2</sub> storage benefits from the sequestration of CO<sub>2</sub> in mineralized form. However, mineral reactions are very slow and difficult to simulate in laboratory experiments or by geochemical modeling. Natural CO<sub>2</sub> fields provide a great opportunity to study the fluid-rock interactions on geological time scales in true, complex geological systems. The Werkendam natural gas field contains > 72% CO<sub>2</sub>. This natural analogue is representative of many potential storage sites in the Netherlands. The insights obtained from the natural analogues can be used to calibrate geochemical models. To be able to distinguish between normal diagenetic reactions and reactions related to CO<sub>2</sub>, an analogue field was selected containing only minor amounts of CO<sub>2</sub> but have the same reservoir type, i.e. stratigraphy and age, at the same present-day depth. To ensure that past burial and diagenetic history of the two fields are comparable, basin modeling was applied to the areas. Based on the integration of basin modeling and petrographic analysis, we succeeded in assessing long-term mineral reactions related to CO<sub>2</sub> presence.