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# $CO_2$ pressurisation of a storage reservoir does not lead to salinization of shallower aquifers through intact caprocks

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Current world-wide scientific activities addressing geological $CO_2$ storage highlight one question of utmost importance for the general feasibility of $CO_2$ storage in saline aquifers: What is the risk for freshwater reservoirs by potential upward brine migration from saline aquifers as a result of pressure elevation in $CO_2$ storage formations?

Within the scope of the present study, we applied coupled numerical multi-phase multi-component ($CO_2$, water and salt) simulations to identify the impact of pressure elevation on brine migration through caprocks for a specific geological setting. The study area is a prospective $CO_2$ storage site in in the Northeast German Basin [1].

A vertical 1D model from reservoir depth to the surface was applied to study the sealing capacity of a multi barrier system with an over pressure of around 30% due to the potential injection of $CO_2$. Three sandstone formations situated in the Middle Bunter are identified as potential $CO_2$ storage formations at depths between about 1,050 and 1,500 m with a cumulative thickness of about 50 m. In addition to the 180 m thick Upper Bunter primary caprock mainly consisting of anhydrite, salt, clay and silt stones, each of the target storage formations itself provide additional caprocks composed of clay and silt stones with average thicknesses of 30 m to 60 m. The model comprises the multi barrier sequence of caprocks and secondary reservoirs (monitoring horizons) above the storage formation.

Results emphasize that saltwater does not reach into the groundwater resources through the existing caprock formations.

[1] Tillner E., Kempka T., Nakaten B., Kühn M. (2013) Brine migration through fault zones: 3D numerical simulations for a prospective $CO_2$ storage site in Northeast Germany. Int. Journal of Greenhouse Gas Control 19, 689-703. doi: 10.1016/j.ijggc.2013.03.012