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AREA OF EXPERTISE:	CO2 Storage – Reactive transport simulation
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DISSERTATION TITLE:	*CO2 storage – Simulations for forecasting the effects and behavior of injection CO2 in geological formations*

The effects and behavior of CO_2 injection in geological formations for long term CO_2 storage, can be forecasted in powerful simulation models. The distribution of CO_2 plume, long-term behavior and the storage capacity in the rock could be roughly predicted and quantified. CO_2 trapped by different mechanisms could be also estimated by the simulations. For example, with the study of reservoir in the Utsira Formation, 8000 years after injection, CO_2 trapped in solution is estimated approximately 70%, assuming that mineral trapping is minor. CO_2 trapped by residual trapping mechanism is ca. 1-3% and the free CO_2 trapped cap-rock is ca. 29%.

In addition, improved reactive simulation model show that the potential of CO_2 trapped in solid mineral phases after long time is significant and the CO_2 fraction that could be transferred into minerals is not small over the 10 thousand years both in Utsira reservoir type rock and in the Colombia River Basalt. Compared to solubility trapping, even quartz-rich reservoir such as the Utsira reservoir, with a small fraction of reactive mineral, has a considerable potential to store CO_2 as carbonates. In the sedimentary basin, the simulations show that the carbonate potential could be determined by amount of reactive compositions such as smectite and glauconite.

Finally, we suggested a stepwise procedure for modeling long-term CO_2-water-rock interactions to allow reaction to be included in large-scale reservoir simulations. The PhD thesis consists of many numerical simulation studies for different aspects in CO_2 storage.