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The influence of CO_2-SO_2 - brine mixtures on petrophysical parameters of potential reservoir sandstones

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The main objective of this study is to investigate the interaction between CO_2/CO_2-SO_2 – brine mixtures and sandstone samples from potential CO_2 reservoir formations (Buntsandstein, Stuttgart Formation) on petrophysical parameters under realistic pressure and temperature conditions. This is essential to assess the required purity of the CO_2 from the capture process in order to avoid reservoir damage. We built a long-term experimental flow assembly designed for a maximum pressure of 600 bar at a maximum working temperature of 150°C. The internal set-ups allow for the determination of P and S wave velocities, electrical conductivity and permeability at samples of $30\,mm$ in diameter and $60\,mm$ in length. Additionally, the experimental equipment is capable for capillary pressure experiments. In this case, elastic wave velocities and electrical resistivity are determined as functions of the water saturation of the rock samples.
To date, we have performed long-term (several weeks) two-phase flow experiments using CO_2 and brine at different ratios. The flow experiments showed not the expected changes of the measured physical rock properties. This can be explained by the high residual water saturation of most samples, which vary between 40 and 70%.
We also present first results from experiments with CO_2-SO_2- mixtures.