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Mathematical model of kinetic mass transfer and transport of CO2 in shallow subsurface

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In this work, we investigate CO2 exsolution, transport, trapping and dissolution in shallow subsurface under various conditions.

First, we introduce mathematical model describing the system. For the mass transfer of CO2 the rate limited model is used.

Numerical results obtained using the model are compared to the experimental data obtained from two sets of experiments: 1D column experiments and intermediate scale 2D experiments. In all the experiments water with dissolved CO2 was injected into the tank and the fate of dissolved and gaseous CO2 was observed.

The experiments were conducted under various conditions including different heterogeneity configurations, flow rates and dissolved CO2 concentration.

We investigated the effects of the different conditions in the experiment on the studied processes of exsolution, transport, trapping, and dissolution and addressed these dependencies in the mathematical model.

References

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