

# AN EFFICIENT AND FLEXIBLE GROUNDWATER MODELLING ENVIRONMENT FOR NUTRIENT VULNERABILITY MAPPING

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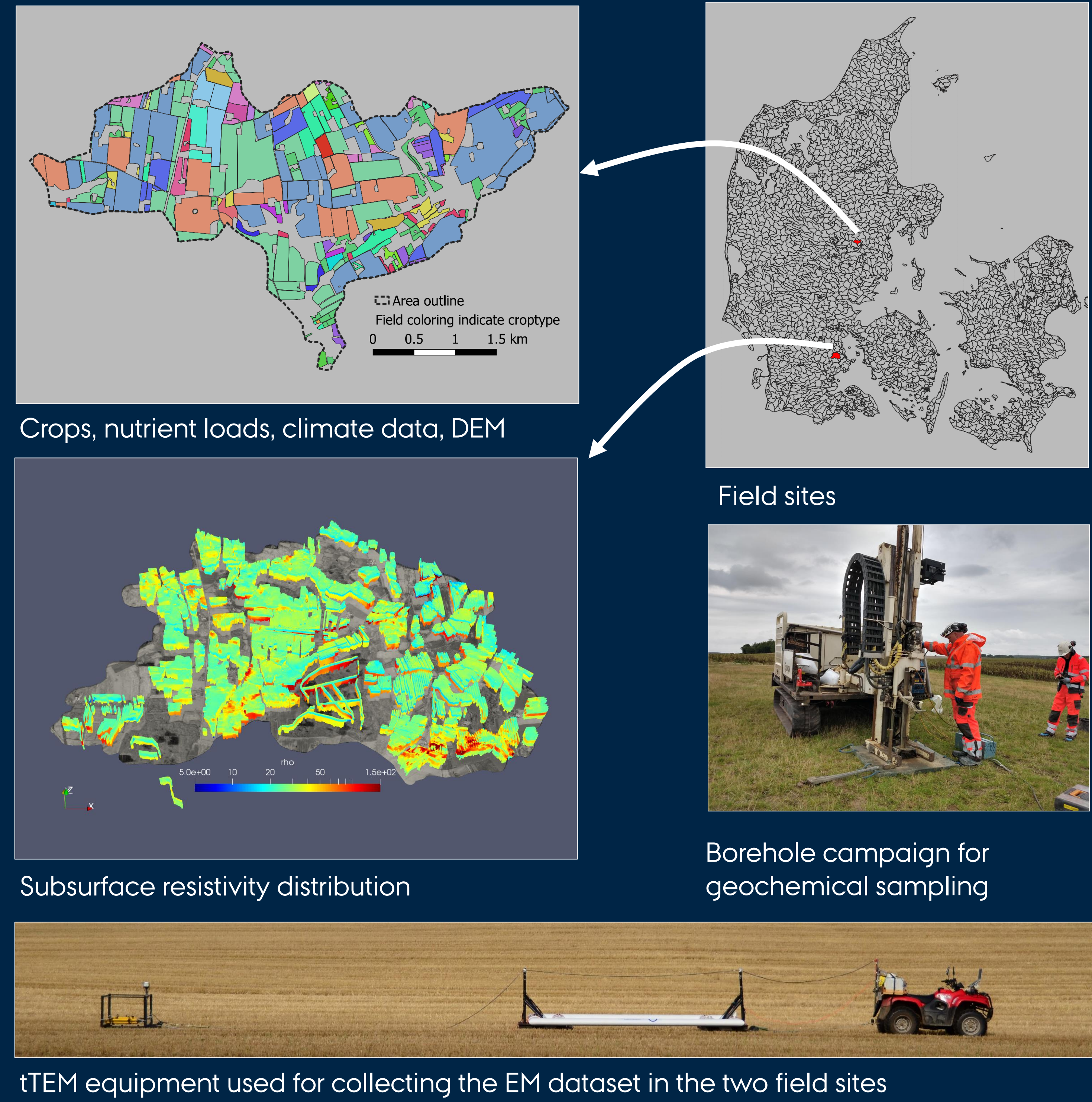
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## INTRODUCTION

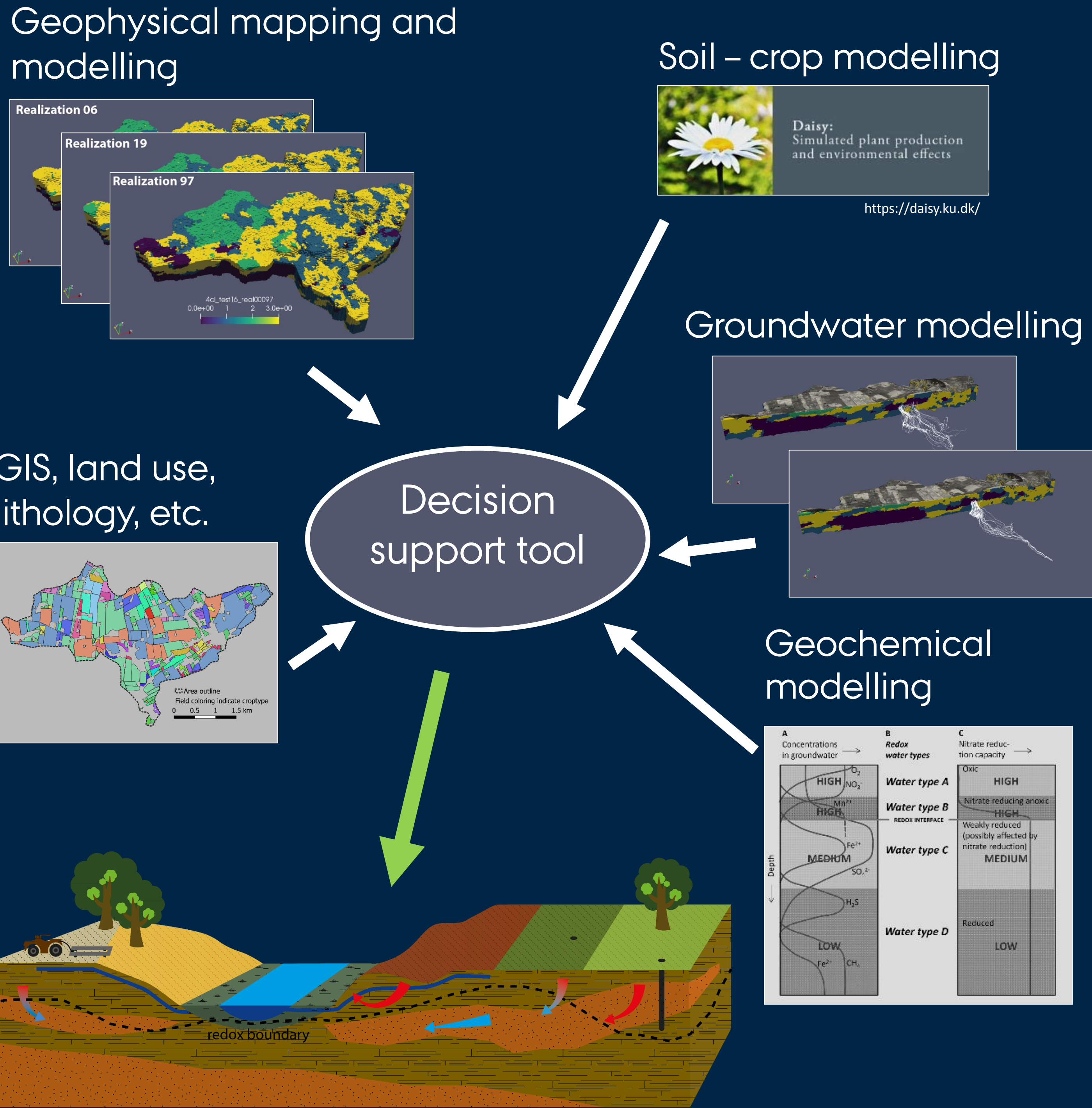
Leaching of nitrate from agricultural fields poses a threat to the aquatic environment in many parts of the world. High concentrations of nitrate in surface water bodies can result in eutrophication and oxygen depletion, and nitrate in groundwater used for drinking water has been linked to colorectal cancer (Schullehner et al., 2018). Identification of robust areas with limited nitrate leaching is therefore the focus of the research project “Open landscape

nitrate retention mapping (rOpen)”. A central part of the project is the development of an integrated hydrological modelling tool informed by dense 3D geophysical data, local lithological knowledge, hydrogeochemistry, on field practices and hydrology. The environment is used to predict the leakage of nitrate from specific fields, and the associated uncertainty.

## FIELD SITES AND DATA



## MODELLING FRAMEWORK



## SUMMARY AND CONCLUSIONS

- We have developed a fast and data driven framework for nitrate vulnerability mapping
- Structural realizations of hydrogeology and redox conditions are based on high resolution geophysics and geochemical sampling
- The hydrological framework is based on FloPy (Bakker et al., 2016)
- All model development and data management is developed in Python 3.
- Uncertainty estimates are based on Bayesian Evidential Learning (Satija et al., 2017)

## REFERENCES

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- Satija, A., Scheidt, C., Li, L. and Coers, J., 2017. Direct forecasting of reservoir performance using production data without history matching. Computational Geosciences, 21(2): 315-333.
- Schullehner, J., Hansen, B., Thygesen, M., Pedersen, C. and Sigsgaard, T., 2018. Nitrate in drinking water and colorectal cancer risk: A nationwide population-based cohort study. International Journal of Cancer, 143(1): 73-79.

