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# OpenGeoSys Tutorial

## Computational Hydrology II: Groundwater Quality Modeling

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# Foreword

This tutorial presents the application of the open-source software *OpenGeoSys* (OGS) (Kolditz et al. 2012) for hydrological simulations concerning conservative and reactive transport modelling. The material is based on unpublished manuals (Bauer 2009) and results of a scientific project cooperation between China and Germany (SUSTAIN $H_2O$). This tutorial has already applied at several international training courses on the subject held in China (2014, 2015). This tutorial is the result of a close cooperation within the OGS community (www.opengeosys.org). These voluntary contributions are highly acknowledged.

This book contains general information regarding the hydrological modelling of a real case study and the step-by-step set-up of a model with OGS and related components such as the OGS Data Explorer. Benchmark examples are presented in detail.

This book is intended primarily for graduate students and applied scientists who deal with hydrological modelling. It is also a valuable source of information for professional geoscientists wishing to advance their knowledge in numerical modelling of hydrological processes, including reactive nitrate transport modelling. As such, this book will be a valuable help in training of computational hydrological systems.

There are various commercial software tools available to solve complex scientific questions in hydrology. This book will introduce the user to an open-source numerical software code for hydrological modelling which can be adapted and extended based on the needs of the researcher.

This tutorial is the second in a series that will represent further applications of computational modelling in hydrological sciences. Within this series, one tutorial has already been published:

- Computational Hydrology I: Groundwater flow modeling, Sachse et al. (2015), DOI 10.1007/978-3-319-13335-5, http://www.springer.com/de/book/9783319133348
- Computational Hydrology II, Sachse et al. (2016), this volume

These contributions are related to a similar publication series in the field of environmental and energy sciences, namely:

- Geoenergy Modeling I: Geothermal Processes in Fractured Porous Media, Böttcher et al. (2016), DOI 10.1007/978-3-319-31335-1, http://www.springer.com/de/book/9783319313337
- Geoenergy Modeling II: Shallow Geothermal Systems, Shao et al. (2016, in press),
- Geoenergy Modeling III: Enhanced Geothermal Systems, Watanabe et al. (2016, in press),
- Geoenergy Modeling IV: Computational Geotechnics: Storage of Energy Carriers, Nagel et al. (2017*),
- Geoenergy Modeling V: Models of Thermochemical Heat Storage, Lehmann et al. (2017*)
- OGS Data Explorer, Rink et al. (2017*),
  (*publication time is approximated).

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