

## **The coupled multiphase flow and reactive transport simulator OGS-Eclipse for CO<sub>2</sub> storage simulations**

**BASTIAN J. GRAUPNER<sup>1,2</sup>, DEDONG LI<sup>1</sup>, KATHARINA BENISCH<sup>1</sup>, ADDISALEM BITEW MITIKU<sup>1</sup>, CHRISTOF BEYER<sup>1</sup> & SEBASTIAN BAUER<sup>1</sup>**

*1 Institute of Geosciences, University of Kiel, Ludewig-Meyn-Str. 10, 24118 Kiel, Germany*

*2 Now at: Eidgenössisches Nuklearsicherheitsinspektorat ENSI, Industriestrasse 19, CH-5200 Brugg, Switzerland*

[bastian.graupner@ensi.ch](mailto:bastian.graupner@ensi.ch)

**Abstract** The long-term prognosis of the behaviour of CO<sub>2</sub> injected into the subsurface is of relevance for risk assessment and reservoir management. Due to the coupled multiphase flow and reactive transport processes interacting in the subsurface, adequate numerical methods are required for a reliable simulation. This work presents the scientific open source software OpenGeoSys, which was coupled to the standard multiphase flow simulator Eclipse. Eclipse provides a fast and reliable numerical solution to the multiphase flow problem, whereas OpenGeoSys is used for simulating component transport and geochemical reactions. This paper shows the code structure and verifies the coupled code by a number of benchmark simulations. The applicability to real site conditions is shown using data for a typical site in the North German Basin.

**Key words** multi phase flow; reactive transport; CO<sub>2</sub> storage, saline aquifer