Geophysical Research Abstracts
Vol. 21, EGU2019-18847-1, 2019
EGU General Assembly 2019

Numerical Simulation of coupled THC-processes with *oops!*®

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For the numerical solution of mathematical models of coupled thermal, hydraulic, and chemical (THC) processes in various geo-systems we develop at LIAG a C++-library named ***oops!***® (open object-oriented solutions). Applications of this tool are models of transport processes in geothermal systems and spontaneous underground coal-fires. These systems are characterized by coupled THC-processes ocurring simultaneously on different spatial and time scales. The chemical reactions take place between mobile and immobile phases. The hydraulic transport is either controlling the chemical reactions or is driven by them. The thermal transport is determined by the convective transport, the thermal conduction, the heat sources, and the thermal boundary conditions. We discuss the aspects of our numerical approach, in particular the capabilities and limits of the time-scale ordered operator splitting method, by simulation examples of such systems.