A reactive transport model for complex geological media

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To study reactive transport in heterogeneous porous media two flexible models are combined: a) The object oriented computer code Complex System Modelling Platform (CSMP++) which can simulate both single and multi phase flow (Matthai and Belayneh, 2004), designed for the simulation of complex geological processes and their interactions; b) A Biogeochemical Reaction Network Simulator (BRNS) capable of solving for kinetically and thermodynamically constrained biogeochemical reactions (Regnier et al., 2002). The flow and transport code (CSMP) uses a second-order implicit scheme for time-dependent advection-dispersion equations in heterogeneous porous media as well as an embedded discontinuity formulation for fractured media (Nick and Matthai, 2011). We study the impact of heterogeneity and density driven flow on reactive transport. Several simulations are carried out to investigate the applicability of the new model for sea water intrusion problems. Computational results suggest that heterogeneity plays a significant role on reactive transport in coastal aquifers that ensued, mainly, by altering the mixing zone thickness.