



Evolution of dissolution patterns by mixing corrosion in karst systems

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Conduit enlargement in a karst system is usually assumed to be controlled by non-linear kinetics that allow aggressive water to penetrate along fractures (Gabrovšek and Dreybrodt, 2000, *Water. Resour. Res.*). However, other mechanism known as mixing corrosion may be decisive for the geometry of the resulting dissolution patterns, at least at depth. Mixing corrosion is caused by the renovation of the dissolution capacity that happens when two waters saturated with respect to calcite but with different CO_2 partial pressure mix. In this case, the reaction rate is mixing-controlled and can be quantified in terms of the mixing proportion of the conservative components of the chemical system (De Simoni et al. 2005, *Water. Resour. Res.*). Therefore, the porosity creation governed by the reaction rate will depend on the chemical differences between the end members and by the degree of mixing.

The aim of this work is to study the evolution of the porosity and permeability within a carbonate matrix by mixing-driven dissolution under different diffusion regimes. The speciation of the chemical system is calculated using CHEPROO. Flow and transport are modeled using an ad hoc code that accounts for feedback between reactions, porosity creation and permeability changes. The effects of the initial porosity field, water chemistry and the resulting geometry of the dissolution patterns are explored for different scenarios.