Rock fracture closure mediated by pressure solution

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A model for evolution of fracture aperture

A model is developed to study evolution of the fracture aperture in crystalline rocks mediated by pressure solution. It accounts for advection through the fracture, diffusion into the rock matrix as well as into the stagnant water existing in the fracture plane, pressure dissolution and free-face dissolution or precipitation of stressed and unstressed minerals in the fracture.

The developed model has been applied to examine the concentration of dissolved minerals in a flow-through test on a natural fracture [1].
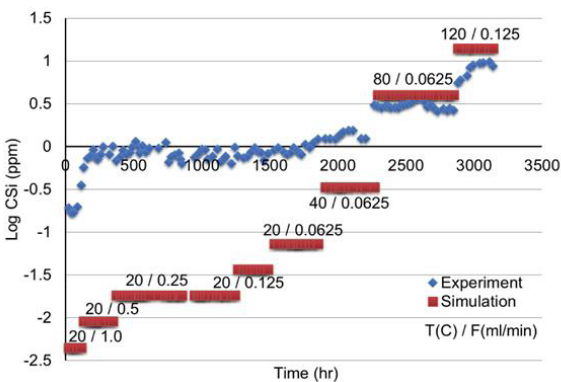

Figure 1. Comparison of Si concentration between experimental results [1] and model predictions.

A multitude of simulations are performed to illustrate the contribution of different processes to the closure rate of fracture. The results are exemplified in Figure 2.

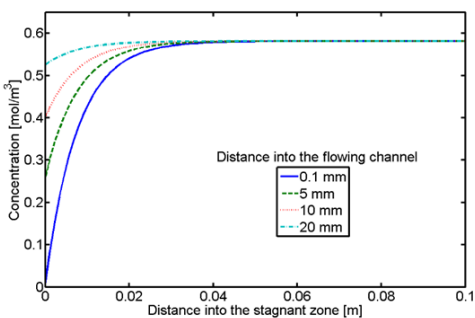**Figure 2.** Concentration of dissolved minerals in the stagnant water zone

[1] Yasuhara *et al.* (2006) *Earth Planet Sci. Lett.* **244**,186–200.