Geophysical Research Abstracts
Vol. 21, EGU2019-16360, 2019
EGU General Assembly 2019

Characterization of the spatial distribution of clogging in fracture networks from core-log data, and impact on network connectivity from DFN modeling

Diane Doolaeghe (1,2), Philippe Davy (1), Caroline Darcel (2), Romain Le Goc (2), and Jan Olof Selroos (3)

(1) Rennes 1 University, OSUR, Géosciences Rennes, Rennes, France, (2) Itasca Consultants SAS, Ecully, France, (3) Swedish Nuclear Fuel and Waste Management Company (SKB), Stockholm, Sweden

In crystalline rocks, flow takes place within the network of open fractures. Predicting flow paths is a basic requirement for groundwater management or environmental risk assessment. A major issue is that a large amount of fractures (up to 80%) is completely sealed by mineral precipitations and rock weathering with potentially important consequences on large-scale connectivity and flow paths. This study aims at characterizing the distribution of sealing in the fracture network. It is part of a risk assessment project related to the deep storage of nuclear waste in Sweden.

The first part of this study relies on the analysis of 23 drilled boreholes (from 200 to 1000 meters deep) from the site of Forsmark (Sweden). The proportion of sealed fractures in boreholes gives an estimate of the total sealed surface regardless of the fracture size. We analyze the repartition of the total sealed surface as a function of fracture density, fracture trace orientation, depth and lithology. At shallow depth (<∼100m), most of horizontal fractures are open. At higher depth, there is a dependency of the sealed surface density with all these parameters, but the relationships vary from place to place. We analyze these dependencies with statistical indicators and define a set of sealing signatures. We also calculate the correlation function between sealed traces as an estimation of possible clustering.

In a second part, we focus on possible dependency of the sealed surface as a function of fracture sizes. This was done by using DFN (Discrete Fracture Networks) modeling approach, and by analyzing the network connectivity for several sealed distribution models. We give a rationale to the results from the percolation theory.