

Interactive comment on “Extracting microphysical fault friction parameters from laboratory- and field injection experiments” by Martijn Peter Anton van den Ende et al.

Anonymous Referee #2

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The manuscript looks to constrain rock frictional properties via laboratory and field experimental data. The authors use the CNS microphysical model for frictional strength and dilatancy evolution and invert. The work stands apart in that (i) it's an effort directed away from more classical models (e.g., rate- and state-dependent friction) and (ii) the careful attention is paid to the parameter inversion itself, including Bayesian inference of parameter probably distributions as well as parameter covariance. The authors are forthcoming in their results, highlighting both the good fit of laboratory data as well as the inability of their model to fit the field experiments with plausible parameters, and the possibility for arbitrary choices for some model parameters (e.g., ϕ_0 or ϕ_c). I think the paper is an exemplary model of its kind.

Minor comments:

-In passing from (5) to (6) it seems implicitly assumed that L in the RHS of (5) is constant when integrating, whereas the resulting expression (6) implies that a substantial evolution of L is possible. Could the problem be closed by presenting an equation such as $dL/d\phi = f(L, \phi)$?

-Equation (11): wouldn't the linear stability analysis results of Ruina, in which (b-a) takes the place of (b) in (11), provide a more relevant critical stiffness close to steady state?

-Could the authors flesh out more directly why there is such a strong dependence on the initial porosity (e.g., Fig. 4)?

Line 94, typo: "an"

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Discussion paper

