

Interactive comment on “Fluid-mediated, brittle-ductile deformation at seismogenic depth: Part II – Stress history and fluid pressure variations in a shear zone in a nuclear waste repository (Olkiluoto Island, Finland)” by Francesca Prando et al.

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The authors provide a detailed structural investigation of a shear zone subjected to brittle overprint. The study is based on several core samples drilled through a mylonitic shear zone that shows brittle overprint of ductile deformation. The paper seems to long and could be more concise and organized. The observations are of interest to readers of SE and eventually deserve to be published.

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Here are a few comments:

The paper is too long in general and should be shortened significantly. In particular, the introduction could be more to the point. As for the discussion, that could be significantly shortened as well since large parts are pure speculation and overinterpretation not supported by observations.

In their analysis the authors focus on quartz microstructure in host rock mylonite and cataclasite. It would be interesting and potentially helpful to know what potential differences exist also for other main minerals such as feldspar or micas.

Based on the presented observations and thermal constraints for the different or possibly overlapping deformation episodes there remains significant doubt that the conceptual model presented in the discussion is sufficiently warranted.

In particular temperatures in the cataclasites are not well constrained and the question arises to the innocent bystander if some of the deformation has to attributed rather to a much younger brittle overprint, possibly even due to reactivation during postglacial uplift. The authors seem to contradict themselves when they exclude that the brittle deformation features were not subjected to ductile overprint but in the discussion forward the idea that ductile deformation was punctuated by brittle ‘events’.

As for the grain size variations within quartz domains. There is no discussion of the potential effects of second mineral phases. It is also unclear, to what extent the cataclasites exploit the presence of fine-grained layers if at all.

To conclude, I suggest radically shorten introduction and discussion focusing strictly on what is really supported by the observations. As suggested, I would also analyze deformation microstructures of other main phases. I hope these, at this stage, rather general comments are useful to the authors.

Sincerely

Georg Dresen

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