

Paper #se-2018-47 submitted to Solid Earth

Title: Multiscale porosity estimates along the pro- and retrograde deformation path: an example from Alpine slates

Dear editor and associate editor,

I have reviewed the above paper which reports the porosity estimates from field to BIB-SEM scales in eight slate samples from the flysch unit related to the Glarus thrust. The authors successfully apply the multiscale approach commonly used to quantify the relationship between macro- and micro-porosity in shales. The results highlight the porosity evolution during the prograde and retrograde phases experienced by these slate samples. They also stress the limit of the methods and the impact of the induced damage during sample manipulation (from collection to laboratory preparation).

Finally they authors provide in appendix the entire dataset necessary to reproduce the figures and analysis shown in the text which is very much appreciated and pave the way for data fully accessible with the publication. Many thanks for doing this.

The subject is very relevant to the journal and the article is very well presented. It is definitely of interest for the geology community, and will be well received by the structural geology, reservoir and petrophysics communities. Therefore, the manuscript is publishable in Solid Earth. As minor points, it would benefit from few improvements before being accepted; please see below for the details.

Page 1

- lines 20-21: "~~A~~**The** developed workflow consists of a combination of bulk rock measurements ~~such as including~~ Helium pycnometry (He-pycnometry)..."

- lines 25-26: "...BIB-SEM, ~~as this technique has shown the least artificially induced porosity by polishing.~~"

This comment is not necessary in this abstract.

- lines 28-29: "...macrofractures (up to 1 mm), which are interpreted to be **either** the effect [...] or ~~these are~~ artificially..."

Is this 1mm value given for the macrofracture length or radius or else? This comment is also valid for the conclusion occurrence as well (page 11, line 38).

- line 37: "...and associated geotechnical problems (**e.g. ref?**)."

- line 38: "in low- ~~and~~to..."

Page 2

- Line 2: "~~Secondly, s~~**Slates also** act"

'Secondly' cannot be used without 'firstly'.

- Lines 37-40: Which 'strong contrast' or you referring too? From 'In addition' to 'exhumation' the words are stating a fact rather than presenting the question the paper is addressing. This part would benefit from clarification. From 'and finally' to the end of the current sentence: this could be extracted and be part of an individual sentence which would further explain why it is necessary to do such a distinction.

Section 3: in order to be consistent and fluent, please be aware to use the past perfect simple tense (ex. was/were + verb ending in 'ed') instead of the present perfect simple tense (ex. is/are +

verb ending in 'ed') as currently written in many places. The occurrences of simple past and present tenses in this section are otherwise correct.

Page 4, line 2: ~~by~~ **using**