Solid Earth Discuss.,
https://doi.org/10.5194/se-2020-6-RC2, 2020

Solid Earth
Discussions

Interactive comment on "Monitoring crustal CO_2 flow: methods and their applications to the mofettes in West Bohemia" *by* Tomáš Fischer et al.

Anonymous Referee #2

Received and published: 6 April 2020

The paper discusses different methods to monitor crustal CO_2 flow, in this case specifically for the West-Bohemia area. The content is of interest to the scientific community and based on a comprehensive collection of long-term monitoring data collected with various methods at different test sites. A main focus is given to the estimation of gas bubble fractions from pressure measurements. What is missing in my opinion is a short summary statement at the end of the method section, how these measurements compare to the other methods utilized in the area. For example a statement about the performance of resistivity measurements, which were also used to estimate the gas bubble fraction although in a different set-up, would be interesting. In general, the paper is well-written and structured, however some clarifications would be beneficial. My suggestions are all minor and listed below by page and line number:

P2 L50: Could you please specify which fault zone is meant here?

Table 1. CarbonNet monitoring network: Hartoušov, the 105.8 m deep borehole is not mentioned in the description of the network in the main text (unless I missed it). Is the borehole used as the reference borehole for the integral method described in the following?

P6 L183: "ceiling of the aquifer" the term seems strange to me, I assume it means simply the top of the aquifer.

P9 LL 260 – 264: ".... that the gas bubbles have to appear at the penetrated section of the Hartoušov borehole. This allows us to determine the mean volumetric fraction of the bubbles using eq. (3) with $h1(t) = hm(t)$ being the hydraulic head measured at the depth $dm = 4m$, and $h2(t) = he(t)$ being the hydraulic head measured in any depth below the bubble entry depth, which we suppose to be at the upper part of the penetrated section at $de = 20.5m$ (Fig.3)." The statement is confusing to me. If the gas bubbles enter the borehole at the penetrated section, how can the upper part of the penetrated section be below the bubble entry depth? Is the hydraulic head for he actually measured in the Hartoušov borehole or in the reference well mentioned before? I assume the latter is the case according to Figure 4. Could you please clarify the text here?

P10 L 307: What is the observed mass flux at the teste site?

P 10: Section: Laboratory test of bubble fraction method: Could you please state

clearly here which bubble fraction method was tested in the laboratory, the integral or the differential method? I assume the latter is the case.

P 11 LL 346 – 350 (Section: Laboratory test of bubble fraction method): I assume the statement, that the integral method performs better than the differential method, is purely based on the observed correlation of the field data and not supported by the laboratory tests. Although, I agree with the statement it seems to be a bit out of context here. Furthermore, why is a different time window utilized for the differential method in Figure 5 and Figure 6? Maybe a separate section discussing the differences in more detail would be better here including the statement on P13 LL 432 – 436, which I assume refers back to Figure 6 and not Figure 5.

P12 LL 385-386: This statement should be followed by paragraph P12 LL 392-399. The small rearrangement would make it easier for the reader to follow, that there is a large effect on the data due to barometric pressure variations and that these have to be corrected. Maybe that could also be explicitly mentioned, although it is implicitly clear.

P8 L283 and 243: ϕ_o should be capitalized
P10 LL 319-321: Figure 5 should be referenced here.
P11 L338: This should be Figure 5 and not Figure 6.

Interactive comment on Solid Earth Discuss., https://doi.org/10.5194/se-2020-6, 2020.