

Earth Syst. Sci. Data Discuss., referee comment RC4
<https://doi.org/10.5194/essd-2020-362-RC4>, 2021
© Author(s) 2021. This work is distributed under
the Creative Commons Attribution 4.0 License.

Comment on essd-2020-362

Anonymous Referee #4

Referee comment on "The hysteretic response of a shallow pyroclastic deposit" by Luca Comegna et al., Earth Syst. Sci. Data Discuss.,
<https://doi.org/10.5194/essd-2020-362-RC4>, 2021

General comments

The manuscript presents field measurements of rainfall, volumetric soil moisture content and soil suction. Hysteretic wetting and drying paths are shown in the data. The manuscript is reasonably well written, an interesting data set is presented and it describes an interesting phenomenon in the data (hysteretic wetting and drying paths). The data set is well referenced in the manuscript and it is accessible. At the data repository the data are clear and complete, including metadata.

The manuscript nicely analyses hysteretic wetting and drying paths in a data set of volumetric soil moisture content and soil suction. However, I am not sure whether this manuscript's objective fits the aims and scope of the ESSD journal. According to the aims and scope formulated for the ESSD journal, the ESSD journal aims at furthering the reuse of data. Articles may pertain to the planning, instrumentation and collection of data. Interpretation is outside the scope of regular articles. Besides this point, improvements can be made to the description of the context and the methodology for analysing the hysteretic wetting/drying paths. These two points are reflected in the specific comments below: some comments are on more extensively describing the monitoring site and the data collection (specific comments 3, 4, 5, 6), whereas others are on the introduction, methodology and conclusion regarding the analysis of the wetting/drying paths (specific comments 1, 2, 7, 8, 9).

Specific comments

- The introduction does contain a nice description of the hysteretic nature of main wetting/drying paths and scanning curves, and Figure 1 is very illustrative. It also introduces a laboratory experiment on these phenomena. However, the research gap leading to the manuscript's research objective could be better defined in the introduction. For example, is this the first manuscript in which the hysteretic nature of wetting/drying paths are shown in field measurements? Or if that is not the case, what is unique to this data set and study area?
- The topic of the manuscript does not seem well represented by the reference list. 17 out of the 34 items in the reference list are related to author(s) of the manuscript.
- The manuscript presents data for January 2011 to January 2012. Has the data collection in this area not been continued after January 2012? It is stated that the data collection in this area started already in 2002, so it would be nice to also describe the data of 2002 to 2011 in this manuscript (as submitted to the ESSD journal). References to other data sets for this area would also be useful, such as meteorological measurements and discharge measurements, as this helps future reuse of the presented data set by other research groups.
- Line 62-64 and Figure 4: are these values the climatology values for rainfall, temperature and potential evapotranspiration? Over which period of years were these values calculated? Furthermore, are these values estimated for the monitoring site or based on measurements at a nearby meteorological station?
- The monitoring site should be described in more detail. From Line 101-118, which describes the set-up of the monitoring site, it is not clear at which depth the Jet-fill tensiometers of 2002, the Jet-fill tensiometers of 2009 and the TDRs are installed. Could you make a schematic cross section of all the sensors (including types, such as 40 cm and 10 cm TDRs) and at which location and depth they were installed? Fig. 3b only shows a few sensors. Furthermore, what are other characteristics of the monitoring site? For example, is the location uphill or downhill and how does this affect the measurements? It would also be interesting to see photos of the monitoring site, showing i.a. the position of logger(s) and sensors, land cover and surroundings.
- It is very good that the authors mention the sensitivity of the rain gauge and the calibration accuracy of the TDR. What is the uncertainty of the tensiometers? What is the brand and type of the rain gauge?
- Line 123-135 and Table 2, 3, 4: The methodology of fitting the Van Genuchten parameters was not described in sufficient detail. Were the measurement pairs from all nine experiments used? Which algorithm was used for the fitting? Was the fitting done specifically for this manuscript or was it done previously for another paper and did you re-use their result?
- The last part of the conclusion is rather vaguely formulated. Do the results raise questions or do they allow to draw conclusion from the results on how we should set up reliable early warning systems? Please also check the last sentence of the conclusion (Line 354-355).
- Section 2 is long and contains a variety of topics. Consider splitting it in a Section 2 ('Monitoring site') and a Section 3 ('Methodology'), or in subsections with headings that reveal what we can expect.
- In general the manuscript is well written, but the writing also needs some improvement. Consistency in terminology would increase the readability. For example, use one term for 'soil moisture content', 'soil moisture', 'volumetric water content' and ' θ ' if you mean the same phenomenon. Next to that, if a symbol has been defined in the text, the symbol should be used from that point on and not interchanged with the term. Besides the technical corrections below, the manuscript would benefit from a check on the English writing.

Technical corrections

- The unit of soil moisture content values is missing throughout the manuscript.
- Line 36: Define what 'TDR' stands for.
- Figure 2: Define 'T' and 'TDR'.
- Figure 3a: The topography of the study site is not clear from this figure. The figure also misses cartographic elements such as a north arrow and a scale (bar).
- Figure 8 and Figure 10: I suggest to use different colours for the different time windows so that readers can distinguish them when they are (partly) overlapping. This especially applies to Figure 10.
- Table 1: How were these properties determined or what is the source? Furthermore, the symbols used in the table must be defined in the caption or, if they are not used at other places in the manuscript, they could just be written out.
- Line 110: I do not understand what you want to say with "... after cold periods when low temperatures could freeze." It should also be specified what you 'check' for in those periods.
- Line 126: Should 'the field porosity' be changed to 'a porosity'? At Line 96 you describe that the porosity at the monitoring site ranges between 50% and 75%, so this is not 'the field porosity'.
- Line 130: Should 'steepest' not be 'steep'? I think you did not just fit to the steepest of the nine curves?
- Line 134-135: Does 'possible reference lowest boundary' refer back to the main wetting curve and lowest limits as explained in the introduction? If that is the case, please use the same terminology. The same is the case between 'possible reference lowest boundary' in Line 134-135 and 'hypothesized lowest boundary' in Fig. 5.
- Table 2, 3, 4,: Add to the captions that these Van Genuchten parameter values were fitted. For example, you could change 'representative of' to 'fitted to'. Furthermore, the symbols should contain units or an indication of no unit (e.g. [-]).
- Line 142-143: ", typical of the Mediterranean climate, characterized by warm and dry summer." can be removed. The climate the monitoring site has already been outlined in Section 2.
- Line 145: What is the location of this local weather station? Could this be seen or shown in Fig. 3a?
- Line 144-145: If 'Tmin', 'Tmed' and 'Tmax' are not used at other locations in the manuscript, there is no need to define them in the text here. Furthermore, the symbol 'Tmed' is confusing. Could be changed to 'Tmean' or 'Tave'? Are 'minimum' and 'maximum' also 'daily minimum' and 'daily maximum' like the 'daily mean'?
- Line 154-155: Could the potential evapotranspiration be estimated specifically for this year?
- Line 155-157: Is this relevant for the analyses to come?
- Line 182-185: The part "..., which departs from the gravitational -1 only during rainfall." is not clear to me. Besides, the sentence is too long (too many elements).
- Line 185-187: This sentence is not clear to me. What do you mean by "... the soil cover is being crossed by an intense downward flux ..."?
- Figure 8: Where does the hypothesized upper boundary come from?
- Line 189-191: Could you also report the parameters of these curves?
- Line 209-211: Change 'interpolated' to 'fitted'.
- Caption Table 3, Caption Table 4 and Line 205-213: I think all the time windows should be BC? Please check if it is correct that there is also referred to BCD and CD here.
- Line 211-212: This is obvious; you already described that the paths are different.
- Line 225-226: Change 'such a' to 'this'. Several similar occasions throughout the manuscript.
- Line 226-227: Change 'is largely exceeding' to 'largely exceeds'. Add a comma after

'rainwater'. Remove 'owing to the action of plant roots' (you mean transpiration here, right?).

- Line 228-231: Perhaps these two short paragraphs can be combined into one. No need to add tables with fitted Van Genuchten parameters here?
- Line 229: Is 'path BC' correct here?
- Line 255-256: What do you mean with "... did not accommodate the small evapotranspiration demand favouring an essentially downward flow ..."?
- Line 266: Do you mean in the 48 hours before 5 December 2011?
- Line 273-275: One paragraph?
- Line 278-285: One paragraph?
- Line 300: Could this sentence be added to the paragraph above or below? Add a comma before 'suggesting'.