

Comment on **essd-2020-363**

Anonymous Referee #1

Referee comment on "*STH-net*: a soil monitoring network for process-based hydrological modelling from the pedon to the hillslope scale" by Edoardo Martini et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2020-363-RC1>, 2021

Comment on "STH-net: a model-driven soil monitoring network for process-based hydrological modelling from the pedon to the hillslope scale " by Martini et al.

The manuscript presents the data set of a new soil monitoring network, providing soil water content measurements from TDR probes, soil temperatures, and meteorological forcing. The paper is well written and the provided data set is of high relevance for hydrology.

I only have few minor comments that need further clarification or additions to the data set.

Specific comments:

Measurement interval vs. reported data interval: The measurements are taken in a 10 minute interval. However, the data is reported in an hourly resolution. What is the motivation for this?

Please provide more details on the averaging. Line 197 only states "The original files are averaged to hourly values [...]". For cumulative data like the precipitation I assume it is not the average, but the sum of the the values in the previous hour. For the other values, is it the average of values half an hour before and half an hour after the reported time? Please clarify.

Also, the averaging interval of 12 hours to smooth the water content data seems quite long. This could impact the accuracy of the timing of e.g. the arrival of an infiltration front at a sensor location and reduce the information contained in the data set. For example, on October 4/5, 2019 the water content for T08 increases by about 0.1 in 10 hours (in the reported smoothed data). This indicates that the 12h smoothing interval may have a significant impact on some situations with rapid changes in the water content. Please

briefly discuss the impact of the chosen smoothing, consider shorter smoothing intervals or possibly even provide an additional water content data file without this smoothing.

Temperature correction of water content measurements: The relative dielectric permittivity of water depends on the temperature. Temperature measurements are available. However, the manuscript does not mention if the dielectric permittivity for water is calculated temperature dependent. If so, please mention this and provide the details, including information on how the more sparse temperature measurements are inter- and extrapolated to the locations of the TDR probes.

There is very little information on the piezometer (e.g. manufacturer and model). The data itself is missing in the data set, although available since March 2020. Is it the goal to include the data into the data set? If so, I would recommend to add the data as part of this revision.

Overall, there is limited information about the different probes and sensors. I would recommend to add a table, that lists measurement range, uncertainty, and resolution for the different sensors.

Is the time reported in UTC or local time? Please mention this.

Line 144: " ϵ_{soil} is set to 4.6." Please motivate why this value was chosen.

Technical comments:

Line 67-70: "Specifically, the approach followed at the site accounts for the soil spatial variability through detailed soil mapping and is designed to provide in situ data of, to our knowledge, the best quality available to date, with high temporal resolution and dense coverage in the vertical direction, about the soil water dynamics in the vadose zone and of its boundary conditions."

There is no further information about the soil mapping in the manuscript. Is this part of a previous publication for this site? If so, please give a reference here.

In line 83 "Wollschläger et al., 2018" should be "Wollschläger et al., 2017" (at least according to the References).

Lines 112-114: "Each of the instrumented soil profiles located on the hillslopes features seven TDR probes installed at the depths of 0.1, 0.2, 0.3, 0.4, 0.5, 0.6 and 0.7 m, whilst the profiles at P4 and P5 feature additional TDR probes at the depths of 0.8, 0.9, 1 and 1.1 m in order to cover the deeper soils."
P3 seems to also have a probe in the depth of 0.8 m.

Some of the figures have a rather low quality/resolution. This should be improved.