Response to RC1

First of all, we would like to thank the anonymous referee for their detailed and generous feedback. We put a lot of effort into preparing a concise and comprehensible manuscript and thank for the appreciation of that.

We agree that a longer monitoring of soil moisture to cover a full hydrological year and growing cycle of the maize plants would have been desirable, however, it was unfortunately not possible due to limited resources.

Thank you for pointing out that the calculations of changes in soil water storage change were not sufficiently clearly described. Soil water storage changes were calculated for each soil water content time series separately. Soil water storage is the soil water content multiplied by the sensors' measurement increment (0.05). Storage change is then derived by subtracting the soil water storage of one point in time by the previous one to get the difference between two consecutive values. The value of 0.18 was given erroneously and referring to a different sensor. We are happy to add these details to the manuscript and perhaps an equation on that matter to clarify the method.

One of the most critical points in the referee's comments is related to figure 6 on soil water retention curves, which we want to address with a bit more detail. The VGM parameters are included in the associated data publication and were not additionally presented in the manuscript as it is already very rich in data. We agree that the theta_s values, especially of the three Chitedze topsoil samples, are very high and that we did not discuss this aspect sufficiently. The VGM model reached its limitations regarding the parameter estimation and therefore "fixed" th_s and alpha in some cases to constant values (1 and 0.5, respectively), leading to the high values of theta_s as depicted in figure 6. The uncertainty bands associated with these values are extremely high (allowing a range of values of 0.28 to 1.0 for theta_s within the 2.5 and 97.5 % interval, example values from one of the Chitedze topsoil samples). As suggested by the referee, one option is setting th_s ourselves based on the small cylinder estimations but this is only possible for Makoka as porosity was, unfortunately, not measured in Chitedze's cylinder samples. The porosity values derived from the big cylinders (table A1) for both sites were estimated assuming a soil density of 2.65 g cm^{-3} and were not directly measured. Another option to omit this problem would be to use the PDI model instead. This model can fit the water retention observations much better due to the separation into capillary and non-capillary flow. We decided to use VGM previously due to its wider spread in the community. We suggest using the PDI soil hydraulic model instead of the VGM and will revise the subsections accordingly.

We also welcome the referee's check on details resulting in the list of specific including technical errors that we will all gladly eliminate during the revision process. We will provide short answers to that list below (blue: original comment from the referee, black: our response).

Line 188: Last sentence of section 2.3. repeats sentence in lines 173-175.

Thank you! We will remove the repetition.

Line 211: From where does the 0.18 m come ("sensor depth increment")? It is not align with the depths indicated in line 199. Can you provide a formula for the calculation of change in water storage?

Yes, we will do that as suggested above.

Line 228: The ratio of Fe_d/Al_d was lower(!) in Chitedze

Thank you! We will adapt that.

Table 1: no texture data is given for Makoka. Why? You refer to it in lines 216-218.

Thanks a lot for pointing it out. This mistake probably occurred when formatting the table. We will include all data.

Line 236: Here you mention a C/N ratio for the intercrop of 15.4. However, in table 1 a value of 11.3 is given. Which value is correct?

Thank you. We will use the correct value of 11.3 in the text.

Table 2: Difference C content at Chitedze: 1.5 (=30.2-28.7) (instead of 1.8).

Thanks! We will correct that.

Line 249: 4.4 gC kg^{-1} or 4.3 gC kg^{-1} (table 2)?

Thanks, we will correct it to 4.3 in the text as correctly stated in table 2.

Line 252: unit g C kg^{-1} ff.

OK. We will look once again through the manuscript to ensure that the same unit description is used.

Lines 267-8: lower bulk density in gliricidia sites only at 5 cm, but reverse at 15 cm!

We will clarify this in the text and adjust the sentence.

LineS 277-278: In my opinion, this statement is misleading as it contradicts the data from the large cylinders. These show a decrease in Ksat! Indeed, data from the small cylinders show an increase, but that goes along with a decrease in porosity. Here it is certainly better to rely more on the results from the large cylinders, which are probably more reliable.

We understand the contradiction. However, we believe that the data from the small cylinders are more robust as the number of samples taken was substantially larger than for the big cylinders. We can add this point to the manuscript. Also, we will remove the remark on differences in porosities and add instead that the difference were marginal and therefore cannot be considered interpretable. That way hopefully reducing confusion and uncertainty.

Figure 6 gives me some puzzles. I am irritated by the presented retention curves for Chitedze measured in the laboratory, as they show saturated water contents of 0.75-

0.95 m³/m³ (assuming that x-axis indicates volumteric soil water content as indicated in the label). How can this be? Values of this magnitude are not realistic. They also contradict the results from soil cylinders. In which pF-range were the retention curves actually recorded using the Hyprop? What are the values of the van Genuchten parameters (eq. 1) derived from Hyprop measurements? When fitting the retention curve to Hyprop data, it would probably have been more expedient to fix theta_sat to the value measured by soil cylinders. Since the PAW values are directly derived from these retention curves, I also cannot fully trust them.

We have made some suggestions for how to tackle these concerns above and are happy to adapt the manuscript accordingly.

Figure 8, figure caption: E5-E8 in Fig. 7 instead of Fig. 6 Thanks for pointing this out. We will change it!

A few abbreviations are not defined before first use ("BD", "OM") We will check again and include the explanation of the abbreviations that are missing.

Table A1: re-arrange rows and indicate differences in sampling depth for small cylinders (5, 15) and larger cylinders (5, 25) .

Table A3: When comparing figs. 7 & 9 with tabele A3, I think event E4 corresponds to C5 with 17.8 mm (instead of C4 with 3 mm only) Yes, we agree. It should be E4. We will correct that.