Response to Interactive comment by Referee #1

Comments from referee are printed in black. Our responses are printed in red.

First of all, the article is well written, has a clear structure and gives a good overview of the presented data.

Thanks a lot!

Line 201: Can you be more precise about the unexpected increase in soil moisture content? Compared to what is it an increase and can it be seen on figure 6? Why was it unexpected?

The SPADE sensor used for soil moisture measurements showed a clear temperature dependency due to a temperature sensitivity of a specific part in the electronics. This produced overestimation of soil moisture during low temperatures during the winter times. After correcting for this effect, the soil moisture values during winter were reduced to a more realistic level.

The term “unexpected” was probably misleading and will be removed in the revised manuscript.

Figure 6: Is this a sensor which is representative for all sensors?

Figure 6 shows the average of all sensors. We will mention this in the figure caption of the revised manuscript.

Figure 8: There seems to be a rising trend in the soil moisture signal from the start until the system maintenance (approximately 1.5 years). Was this expected, and if not, is the data still useful/can this be corrected?

This might be due to a temporal drift in the electronics of the SPADE sensors, but the exact reasons are unclear. This trend in the average soil moisture content can be corrected using independent cosmic-ray soil moisture measurements (see Baatz et al., 2014), but this is not possible for the individual sensors. Since any correction of individual sensors is going to be subjective because of a lack of appropriate reference measurements, we have decided to refrain from doing further data corrections at this stage. We are convinced that the data are still useful despite possible (minor) sensor drifts, as also demonstrated by a range of recent publications relying on this data (e.g. Qu et al., 2014; Qu et al., 2014; Baatz et al., 2014; Baatz et al., 2015).

Soil moisture sensors have been installed at 87 locations, what about spatial trends in the data set?

A detailed analysis of the spatial variability of the soil moisture has been presented by Qu et al. (2014). We will highlight this in the revised version.

At http://www.tereno.net there seem to be more locations available with soil moisture data within the Rollesbroich catchment. Is it possible to include those extra locations in this paper?

The data set includes data from all sensor network locations that provided data for the whole time period used for this publication. Further sensor locations shown in http://www.tereno.net do not span this time period and thus are excluded. We will however add a comment that data from further sensor locations are available and can be downloaded at http://www.tereno.net.

References

Baatz R., H. Bogena, H.-J. Hendricks Franssen, J.A. Huisman, C. Montzka and H. Vereecken, 2015, An empirical vegetation correction for soil water content quantification using cosmic ray probes. Water Resour. Res. 51(4): 2030–2046, doi: 10.1002/2014WR016443.

Baatz, R., H. Bogena, H.-J. Hendricks Franssen, J.A. Huisman, Q. Wei, C. Montzka and H. Vereecken, 2014, Calibration of a catchment scale cosmic-ray soil moisture network: A comparison of three different methods. J. Hydrol. 516: 231-244, doi: 10.1016/j.jhydrol.2014.02.026.

Qu, W., Bogena, H. R., Huisman, J. A., Martinez, G., Pachepsky, Y., and Vereecken, H., 2014, Effects of soil hydraulic properties on the spatial variability of soil water content: Evidence from sensor network data and inverse modeling Vadose Zone Journal, v. 13, no. 12.

Qu, W., Bogena, H. R., Huisman, J. A., and Vereecken, H., 2013, Calibration of a novel low-cost soil water content sensor based on a ring oscillator: Vadose Zone Journal, v. 12, no. 2.