

## ***Interactive comment on “COSMOS-UK: National soil moisture and hydrometeorology data for empowering UK environmental science” by Hollie M. Cooper et al.***

### **Anonymous Referee #2**

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The manuscript presents the data details of the COSMOS-UK network of soil moisture sensors. This is most certainly a unique network of soil moisture (and related variables) sensors; the research community will greatly benefit from the details provided in the manuscript. The manuscript is well written and makes an interesting reading. I recommend acceptance of the manuscript for publication subject to minor revisions arising from the following comments:

1. The main issue is with an absence of calibration details : Table 5 and the discussion preceding it provide elaborate details of the sampling procedure and determination of soil moisture in the lab. The effectiveness of calibration is however mentioned in just

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one sentence, “There was < 0.03 cm<sup>3</sup> cm<sup>-3</sup> difference in VWC between the soil moisture determined from these samples and the corresponding daily VWC value derived using the site’s initial calibration data”. Table 5 only shows the reference values and not the difference between the point scale measurements and the CRNS data. In the absence of such results, it is difficult to judge how good has the calibration been. Perhaps in the supplementary material, more detailed results of calibration could be given.

2. The claim that the spatial data on soil moisture leads to improved hydro-meteorological forecasts needs to be substantiated, either by citing appropriate references or through a convincing argument.

3. Table 1 gives details of the COSMOS-UK stations. Please consider highlighting the mountainous sites, if any among these. The altitude values shown in the table do indicate the heights at which the stations are located, but a higher altitude does not necessarily indicate a station on a mountain. It would also be interesting to see the soil moisture signatures of the mountainous regions as compared to those in the plains.

4. Is there any irrigation in the area around the CRNS stations? If yes, how has it affected the soil moisture data? Is it possible to filter out the effect of irrigation in the data?

5. Table 4 shows that at the same depth two TDT point source sensors are located. How are they spaced? How is the data from the two sensors merged?

6. Lines 183-184 : Volumetric samples are taken at five depths, upto 0.25 m bgl. However, the CRNS data is between 0.1 m to 0.8 m. Is there any calibration for depths below 0.25 m?

7. Fig 2 (appearing around line 272) should be Fig. 6.

8. It is difficult to understand the “automatic processing” for quality checks. Table 6 provides the flags raised for various events, but how these events are identified in the data is not clear (for example, how does the automatic processing detect simultaneously,

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missing data and small sample of data?)

9. Fig. 8 caption may be made more descriptive. Also, the caption states that these are the observations required for PE calculation, but the last panel in fact shows the PE calculated! It would also be interesting to see the soil temperature plot along with the other variables shown here (although soil temperature is not used in PE calculation).

10. Please also discuss how the soil moisture measured at these 51 stations may be smoothed to upscale it to the national scale (see line no. 396).

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