

## ***Interactive comment on “A dense network of cosmic-ray neutron sensors for soil moisture observation in a pre-alpine headwater catchment in Germany” by Benjamin Fersch et al.***

### **Anonymous Referee #1**

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#### General comments

This paper describes a number of extensive data sets collected concurrently from a headwater catchment in Germany. The availability of such a diverse range of measurements in a geographically restricted area offers unique opportunities for CRNS data analysis and testing of data correction and modelling approaches.

The authors are to be commended for collating such a high quality dataset.

A number of grammatical corrections are required (see specific comments below) but the paper is generally well written.

C1

I am not sure if the title of the paper is a good representation of the content as there is just as much data on meteorology and alternative soil moisture information as there is on CRNS measurements. Not sure how best to capture the breadth of observations but perhaps a title along the lines of the following might be better. . .

A dense network of cosmic-ray neutron sensors for soil moisture observation in a pre-alpine headwater catchment in Germany including supplementary meteorological and hydrological observations

OR

A dense network of cosmic-ray neutron sensors and supplementary measurements for soil moisture observation in a pre-alpine headwater catchment in Germany

The datasets are well organised with suitable metadata and data structures used throughout. I would like to have seen a version of the CRNS static data with an estimate of soil moisture data using a predefined approach. I realise techniques are evolving and the key focus is on CRNS processing options but this would provide an off-the-shelf option for some users who just want some measure of soil moisture for analysis (i.e. hydrologic model, satellite cal/val). This may increase data utilisation. As it stands the raw counts and all of the data required for corrections and processing are provided but users with little experience in the CRNS field may be a little reluctant to process the data themselves.

#### Specific comments

Line 8 – change ‘that network’ to ‘this network’ Line 10 – change to ‘... allow users to ...’ Line 19 – change to ‘...EU-DAT and is split into two subsets...’ Line 19 – 1st hyperlink includes first part of reference and does not work Line 29 – maybe spell out TDR and TDR first time through Line 31 – do you mean support volume Line 36 – add ‘are’ between ‘and’ and ‘thus’ Line 39 – it might be less clunky to just say they have poor temporal resolution Line 44 – not sure describing the footprint as exponentially

C2

shaped is a good description. The footprint declines radially with distance from the CRNS – its more bell shaped or declines exponentially with distance from the CRNS  
Line 48 – ‘...presented the first...’ Line 58 – change to “... monitoring exists and these use various gases...” Line 87 – suggest deleting after the : Line 88 – needs rewording – does not make sense as is Line 96 – change ‘of’ to ‘in’ Line 130 – change ‘had’ to ‘have’ Line 149 – delete ‘however’ Line 156 – by backbone do you mean existing long-term datasets? If so suggest changing Line 160 – change ‘could identify’ to ‘identified’  
Line 170 – insert ‘this was’ between ‘and’ and ‘followed’ Line 213 – do you mean back ground? Figure 2 is not referenced in the text Fig3 caption – use “Note: y-axis scaling differs between plots” Line 361 & Line 362 – inverted commas wrong Line 374 – needs to be reworded for clarity. What is being constrained? Models? Para starting  
Line 386 – change to “A large number of manual soil moisture measurements were carried out from June 25 to 26, 2019 and these were useful for increasing the spatial coverage of the continuously-recorded soil moisture data, enabling the calibration of the moisture sensors and obtaining basic soil properties (bulk density, residual water content, organic matter content, texture). Line 475 – change ‘is’ to ‘was’ Line 493 – ‘on top of’ Line 567 – remove ‘yet’ and ‘already’ Line 578 – delete ‘already’ Line 600 – change to “...allow users to...”

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