Supplement to "Space-time soil moisture retrieval at the catchment scale using a dense network of cosmic-ray neutron sensors"

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S1 Fitting vertical profiles for soil variables

As pointed out in the main manuscript, we decided to generalize the vertical distribution of soil variables v_i (i.e. θ, ρ_b, SOM, LW) across the study area. To that end, we fitted a piecewise linear function with two parameters to each profile and variable: from the soil surface (0 cm) down to a depth of 13 cm, the function assumes a linear change of any variable value from $v_i(0cm)$ to $v_i(13cm)$. Below 13 cm depth, the variable is assumed to remain constant at a value $v_i(13cm)$. This approach has been found to reflect the typical vertical distribution pattern for all soil variables fairly well, while reducing spurious effects of outliers when the variables are horizontally interpolated.

The following figures illustrate the results for profiles that were manually sampled using soil cores.

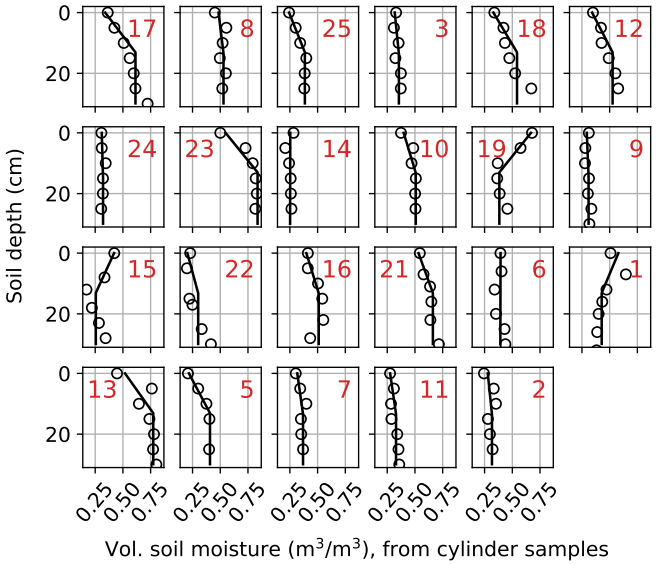

Figure S1. Measured profiles of volumetric soil moisture and corresponding function fits. The circles denote volumetric soil moisture as sampled by soil cores (from 0 to 30 cm in increments of 5 cm). These profiles were sampled in the direct vicinity of the CRNS sensors. The sensor ID is shown in red text. The solid black lines show the function fits.

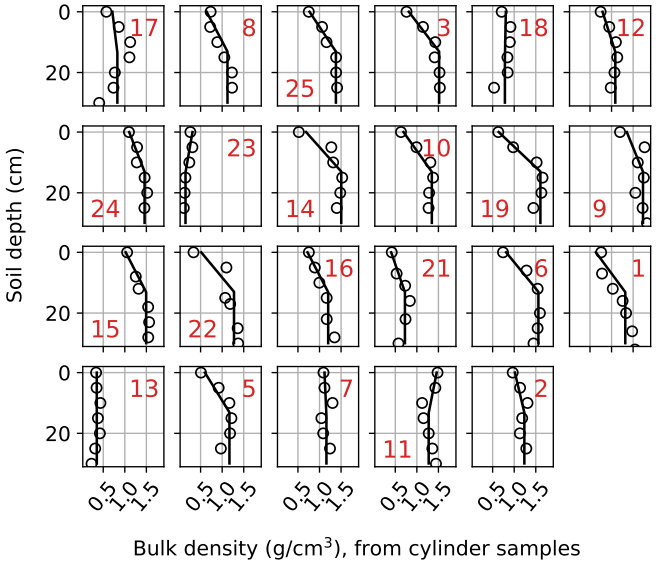

Figure S2. Measured profiles of soil bulk density and corresponding function fits. The circles denote soil bulk density as sampled by soil cores (from 0 to 30 cm in increments of 5 cm). These profiles were sampled in the direct vicinity of the CRNS sensors. The sensor ID is shown in red text. The solid black lines show the function fits.

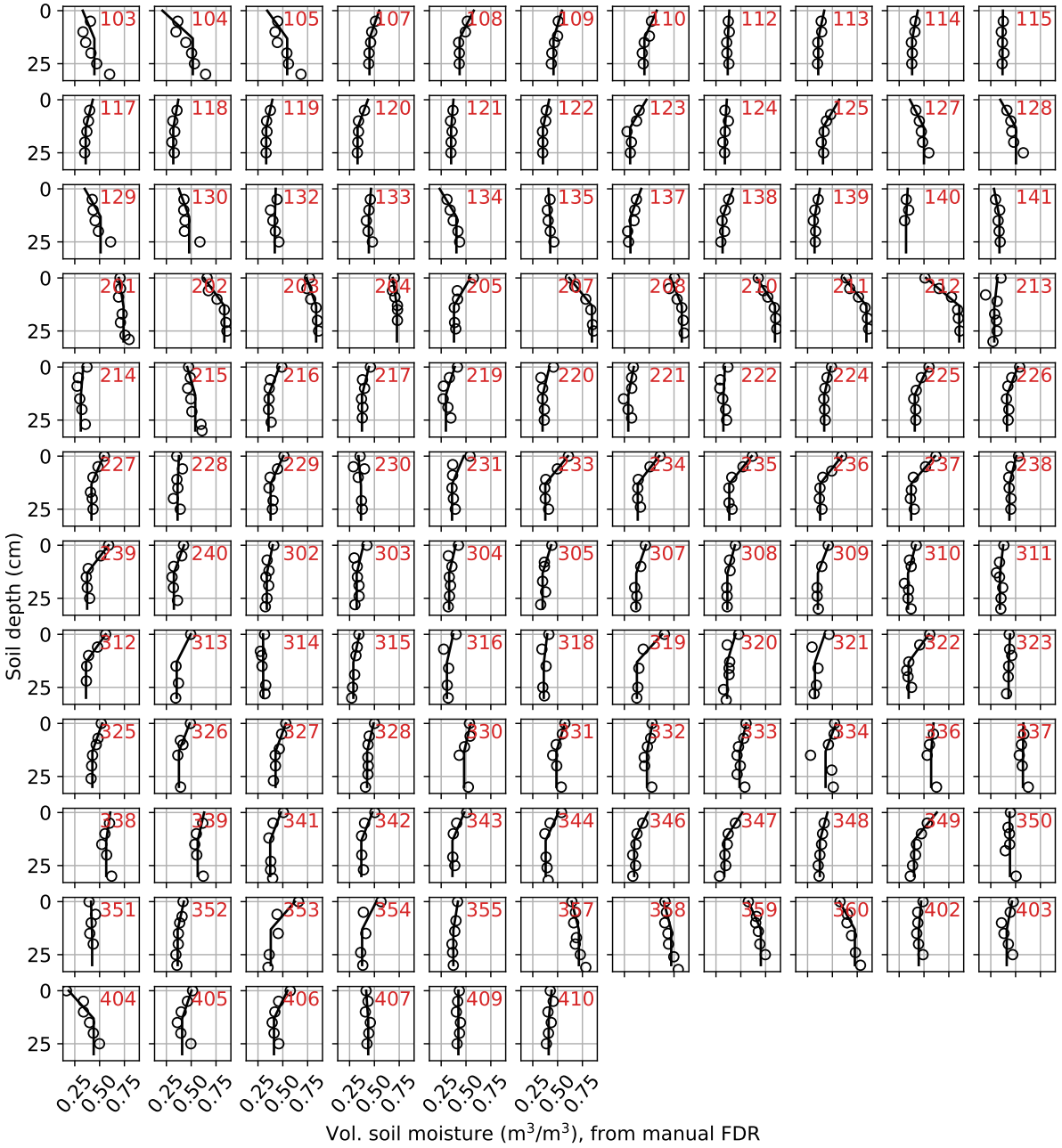

Figure S3. Measured profiles of volumetric soil moisture and corresponding function fits. The circles denote volumetric soil moisture as sampled by manual FDR measurements (from 0 to 30 cm in increments of 5 cm). The sample ID is shown in red text. The solid black lines show the function fits