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Uncertainty, sensitivity and improvements in soil moisture estimation with cosmic-ray neutron sensing

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1 **Uncertainty, sensitivity and improvements in soil moisture estimation with cosmic-ray**  
2 **neutron sensing**

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16 **Abstract**

17 Cosmic-ray neutron sensing (CRNS) is a promising proximal soil sensing technique to estimate  
18 soil moisture at intermediate scale and high temporal resolution. However, the signal shows  
19 complex and non-unique response to all hydrogen pools near the land surface, providing some  
20 challenges for soil moisture estimation in practical applications. Aims of the study were 1) to  
21 assess the uncertainty of CRNS as a stand-alone approach to estimate volumetric soil moisture in  
22 cropped field 2) to identify the causes of this uncertainty 3) and possible improvements. Two  
23 experimental sites in Germany were equipped with a CRNS probe and point-scale soil moisture

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