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## Long-term soil moisture observations using cosmic-ray neutron sensing in Austria

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This study presents the results of soil moisture investigation carried by the Joint FAO/IAEA Division using Cosmic-Ray Neutron Sensor (CRNS). The measurements have been collected at several studied sites in Austria. The Petzenkirchen study which is within the Austrian Institute for Land and Water Management Research employing stationary CRNS has been established in Dec. 2013 and it provides major dataset for this study. It represents small watershed in hilly area of northern footslopes of Alps. Apart of that the short-term measurement campaigns were carried out using back-pack CRNS in alluvial plain east of Neusiedler See and in mountainous areas of Rauris Municipality in central part of Austrian Alps.

This study describes the results and interpretation of about 7 years of soil moisture data set (2013-2020). The analysis focused on improving the calibration approaches, CRNS footprint, heterogeneity soil moisture mapping, impacts of biomass and altitude on neutron counts. Further, the use of CRNS data for calibrating soil moisture calculated by soil water balance model was tested. The overall application is aimed at supporting agricultural water management and in developing methodology for soil moisture monitoring for water management in agriculture (under rainfed agriculture as well as for irrigation scheduling). This unique data-set can also provide additional information for hydrological modelling and remote sensing applications (at regional and global scales), as well as for extreme weather events (drought and flood) management and forecasting.