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Soil water retention curves determined in the laboratory and in the field

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Soil water retention curves (SWRCs) provide information on the energy status of soil water and its availability to plants and are therefore important for irrigation management. SWRCs have traditionally been determined in the laboratory. With the development of new equipment that allows continuous measurement of soil water content and matric potential, it is possible to generate SWRCs in the field. The objective of our study was to determine SWRCs from continuous measurements in the field using dielectric methods and to see how SWRCs change over time. We compared them to SWRCs determined in the laboratory on undisturbed soil samples using the evaporation method (HYPROP®, METERgroup, Munich, Germany). Both the SWRCs determined in the field and in the laboratory were based on drying data only. Our results show significant differences between the SWRCs determined in the laboratory and in the field. For a given value of the matric potential, SWRCs in the laboratory often reach higher water contents, which can be attributed to the difference in soil wetting in the laboratory and in the field. The SWRCs constructed in the field also exhibit temporal variations. Therefore, we can conclude that the use of a single laboratory-constructed SWRC is not sufficient to describe the relationship between soil water content and matric potential.