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# Soil water repellency characteristic curves for soil profiles with natural organic carbon gradients

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Soil water repellency (SWR) is a phenomenon that influences many soil hydrologic processes such as reduction of infiltration, increase in overland flow, and enhanced preferential flow. SWR has been observed in various soil types and textures, and the degree of SWR is greatly controlled by soil moisture content and levels of organic matter and clay. One of the key topics in SWR research is how to describe accurately the seasonal and temporal variation of SWR with the controlling factors such as soil moisture, organic matter, and clay contents for soil profiles with natural organic carbon gradients. In the present study, we summarize measured SWR data for soil profiles under different land uses and vegetation in Japan and New Zealand, and compared these with literature data. We introduce the contact angle-based evaluation of SWR and predictive models for soil water repellency characteristic curves, in which the contact angle is a function of the moisture content. We also discuss a number of novel concepts, including i) the reduction in the contact angle with soil-water contact time to describe the time dependence of SWR, ii) the relationship between the contact angles from the measured scanning curves under controlled wetting and drying cycles, and iii) the initial contact angles measured by the sessile drop method.