Science Societies

Can We Predict Available Water Capacity from Long- Term Soil Moisture Data?

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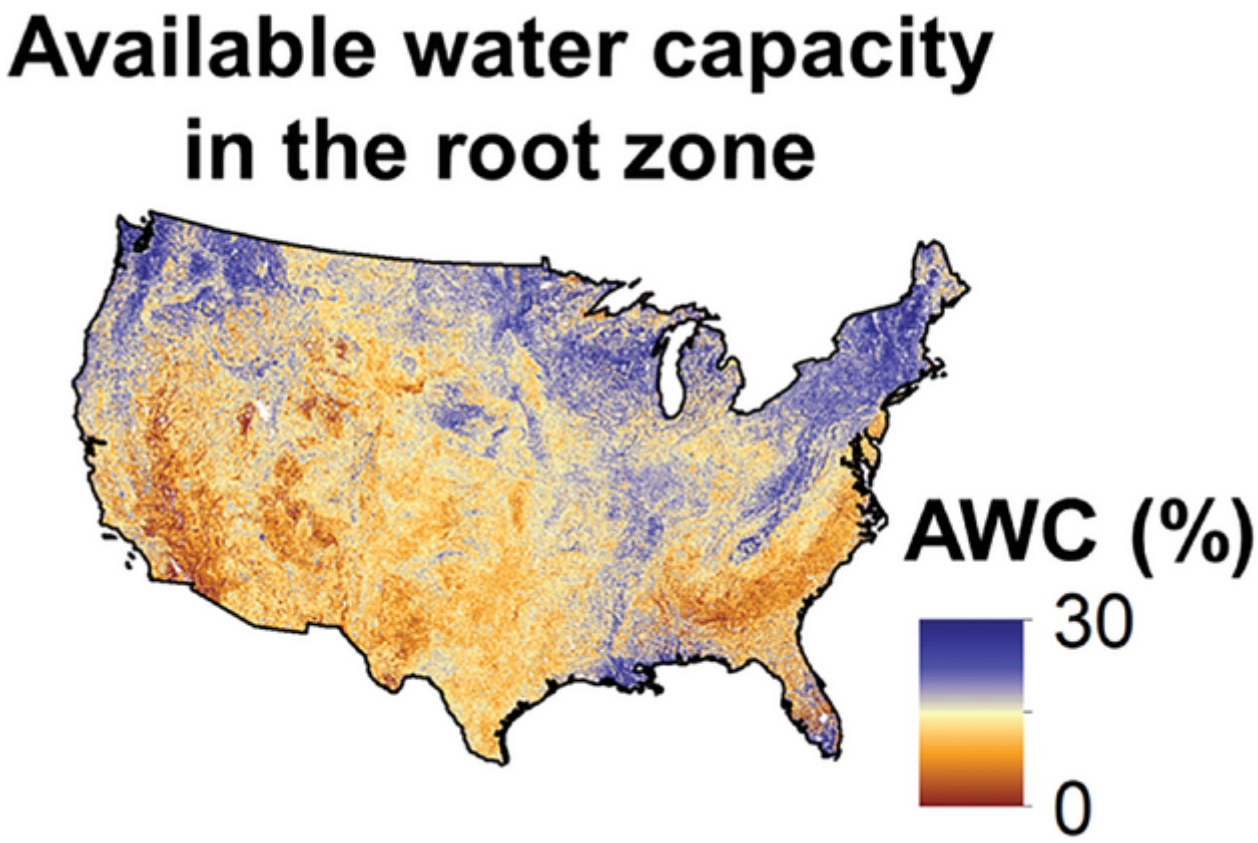

Soil available water capacity (%) in the root zone varies drastically across the conterminous United States. Image by Meetpal S. Kukal.

Soil moisture is measured globally using ground and satellite sensors. However, assessing actual crop water availability to infer crop water stress, track droughts, and manage irrigation also requires interpretation of the soil's field capacity and wilting point, the upper and lower limits of available water capacity. The time and costs of measuring available water capacity at proper granularity in the lab make it challenging to effectively map this range in space and time. Soil moisture extremes are commonly used to infer these properties; however, this assumption and practice has remained unevaluated.

Researchers at The Pennsylvania State University investigated how lab-measured field capacity and wilting point compare to extremes of long-term soil moisture data gathered at 182 sites nationwide. They found that the degree to which soil moisture extremes can represent field capacity and wilting point depends on precipitation and clay content at the site.

Estimates of field capacity and wilting point may help track improvements in available water capacity from climate-smart agriculture practices across large regions, without the need for expensive and laborious lab measurements.

Adapted from Kukal, M. S., & Irmak, S. (2023). Can limits of plant available water be inferred from soil moisture distributions? Agricultural & Environmental Letters, 8, e20113. https://doi.org/10.1002/ael2.20113