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A Review on Temporal Stability of Soil Water Contents

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Temporal stability of soil water content (TS SWC) has been observed across a wide range of soil types, landscapes, climates and scales. A better understanding of TS SWC controls and their interactions needs to be developed. The objective of this work is to develop a comprehensive inventory of published data on TC SWC and to determine knowledge gaps. Mean relative difference (MRD) values and associated standard deviations (SDRD) were digitized from 157 graphs in 37 publications and analyzed. The MRD followed generally a Gaussian distribution with the determination coefficient $R2 > 0.84$. The standard deviation of MRD (SDMRD) showed a trend of increase with scale. No relationship between SDMRD and R2 was observed. The smallest R2 values were mostly found for negatively skewed and platykurtic MRD distributions. An analysis of seven measurement-, terrain-, and climate-related TS SWC controls suggested strong interactions and showed that combined effects are typically observed. Many of the existing datasets on TS WCS are mostly byproducts of soil water dynamics studies in agronomic or environmental projects. Future research should include more focused TS SWC studies tailored to understand interactions of controls, underlying mechanisms, and efficiency of applications.