## Supplement of

# Data worth analysis within a model-free data assimilation framework for soil moisture flow 

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Figure S1. The expected data-worth of potential soil moisture observations in the surface, middle, and deep layers in the form of trace $\left(T_{r}\right)$, Shannon entropy difference (SED), and relative entropy $(R E)$, respectively, regarding the retrieval of average soil moisture in the top $0.30 \mathrm{~m}, 0.60 \mathrm{~m}$, and 1.00 m at three sites, when EnKF is replaced by particle filtering (PF) in the proposed NP-DWA framework


Figure S2. The expected data-worth of potential soil moisture observations in the surface, middle, and deep layers in the form of $T_{r}$, SED, and $R E$ regarding the retrieval of average soil moisture in the top $0.30 \mathrm{~m}, 0.60 \mathrm{~m}$, and 1.00 m at DAHRA site, when GP is replaced by support vector machine (SVM) and random forest (RF) in the proposed NP-DWA framework, respectively

