



**Figure S1.** Spearman's rank correlation of the near-surface (top 5 cm) soil moisture with the top 25 cm soil moisture and with the root zone (top 100 cm) soil moisture, respectively, for the time lag ranging from 0 to 60 days based upon the in situ measurements at the four RISMA stations: (a) ON2, (b) ON4, (c) ON5, and (d) ON6. Positive lags indicate that the near-surface soil moisture leads the subsurface soil moisture. For each pair of comparison, a vertical dashed line is provided to indicate the time lag with the maximum Spearman's rank correlation.