



SMAP soil moisture diagnoses systematic error in an operational hydrologic model



Problem: Hydrologic models track soil moisture levels to forecast future streamflow amounts. Models must therefore adequately represent the relationship between current soil moisture and future streamflow.

Finding: Across ~750 medium-scale basins in the US, Figure 1a shows the median observed between SMAP Level 4 root-zone soil moisture (RZSM; 0 to 1-m) anomalies - for various calendar dates - and observed 90-day streamflow (Q) anomalies starting L days in the future. Figure 1b shows the same for RZSM estimates from the operational National Water Model (NWM). The lagged RZSM/Q correlations for NWM are often significantly less than comparable SMAP-based values (Figure 1c).

Impact: Widespread underestimation of lagged RZSM/Q correlations in the NWM suggests that the NWM neglects an important source of seasonal Q predictability. Improving the processes relating RZSM and Q in NWM should lead to better Q forecasts.

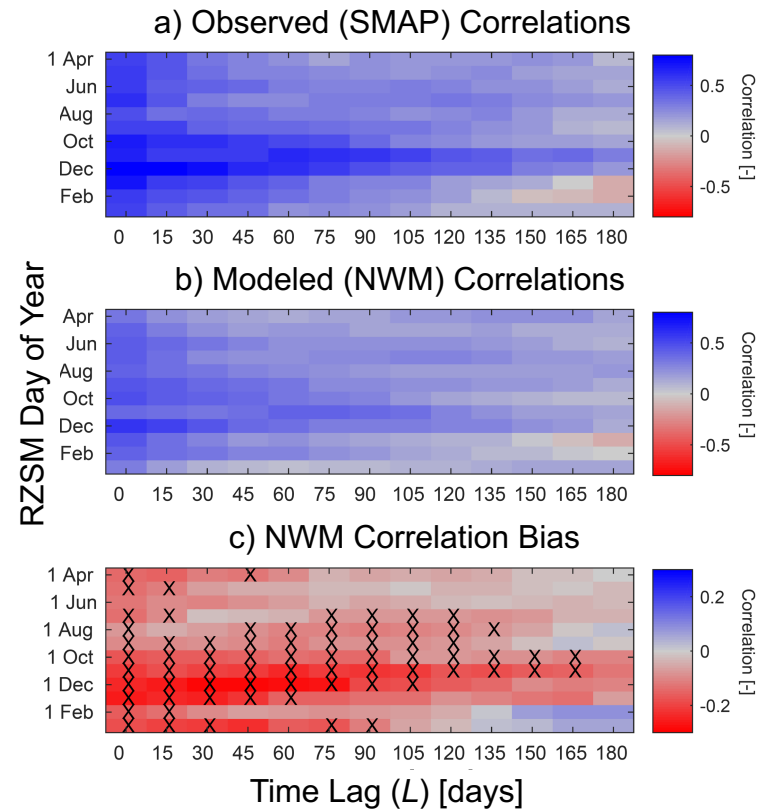


Fig. 1. a) Observed anomaly correlation between RZSM and lagged, 90-day Q sums, b) as in a) but for NWM RZSM and Q, and c) correlation bias (observed minus modeled). Values are median correlations across ~750 medium-scale US basins. X's indicate that bias is significant at 95% confidence.