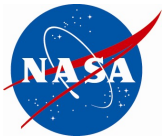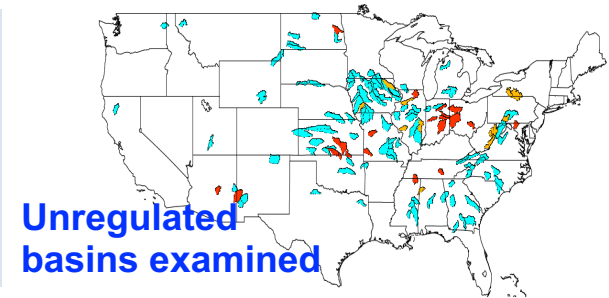# Estimating Basin-Scale Water Budgets with SMAP Soil Moisture Data
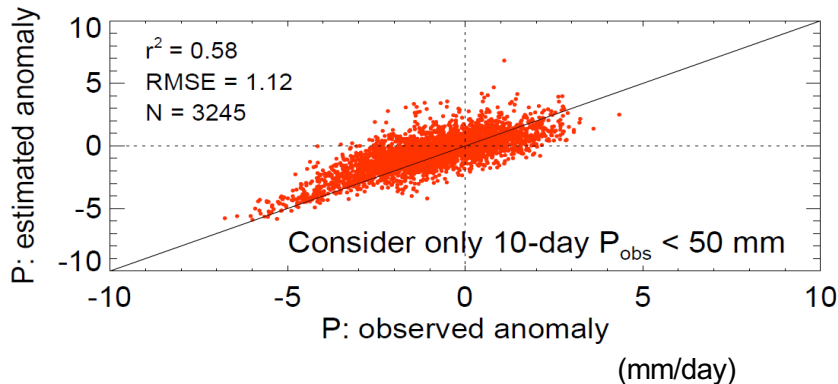
Problem: Because SMAP measures the soil moisture within a critical "gateway" between atmospheric and subsurface hydrological processes, SMAP data may contain valuable information on large-scale water fluxes (precipitation and streamflow). To what degree can such information be extracted?
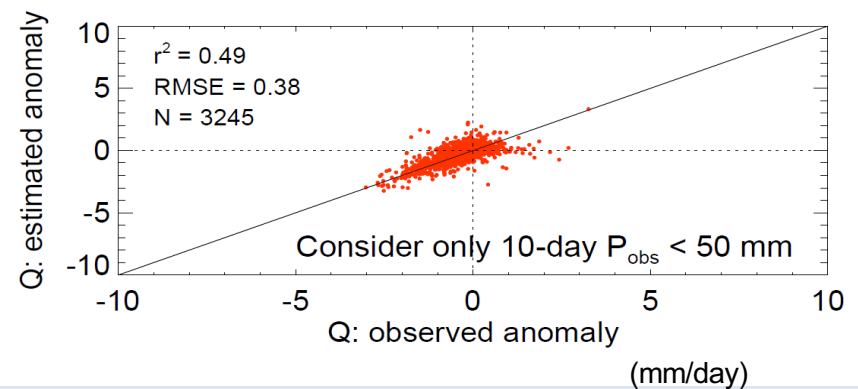
Finding: SMAP-based algorithms for estimating basin-scale precipitation and streamflow are calibrated on 2-years of observations and then evaluated during a 3rd (independent) year. The SMAP-based estimates do prove to contain relevant information on the fluxes.

Unregulated basins examined

SMAP-based precipitation estimates vs. obs.

$r^2 = 0.58$
RMSE = 1.12
N = 3245

Consider only 10-day P_{obs} < 50 mm

P: estimated anomaly — P: observed anomaly (mm/day)

SMAP-based streamflow estimates vs. obs.

$r^2 = 0.49$
RMSE = 0.38
N = 3245

Consider only 10-day P_{obs} < 50 mm

Q: estimated anomaly — Q: observed anomaly (mm/day)

Impact: SMAP-based estimates of large-scale water fluxes may prove useful as additional constraints on fluxes measured via more conventional techniques.

Koster, Crow, Reichle, and Mahanama, 2018: Estimating Basin-Scale Water Budgets With SMAP Soil Moisture Data, *Water Resources Research*.