The Potential for Estimation of Soil Moisture at a 'Point' Scale

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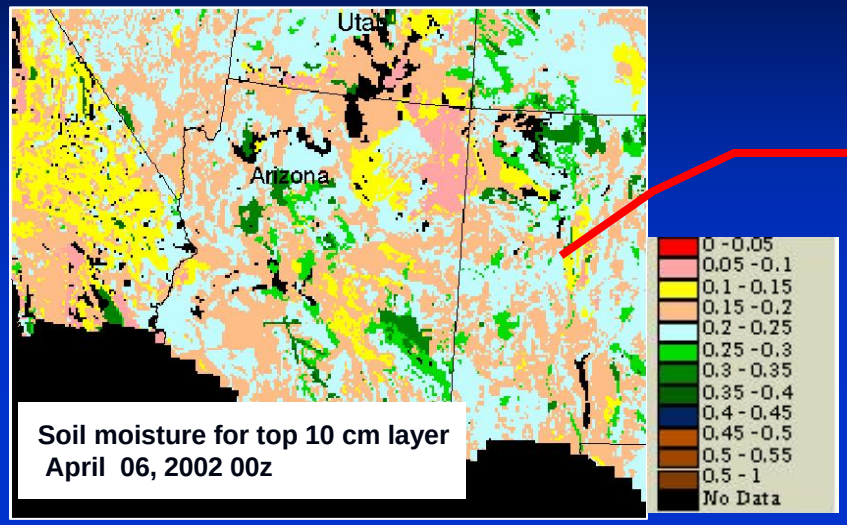
Motivation

- Application of SAC-HT with a priori parameters over Oklahoma at HRAP scale has shown reasonable accuracy of watershed-scale soil moisture (above 100 sq. km). However, results degrade considerably at ‘point’-scale where irrigation users have the most interest.

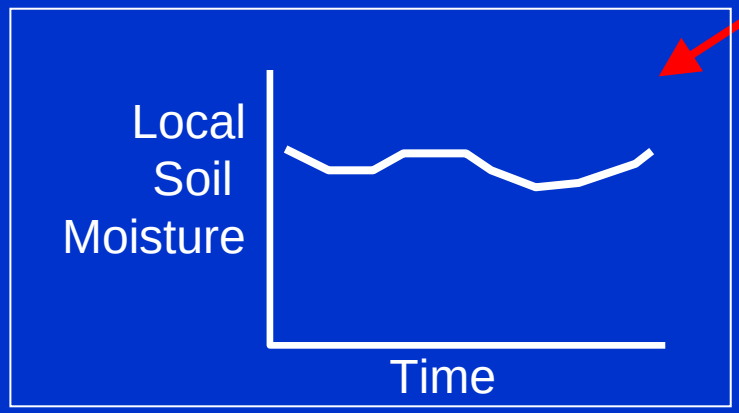
- Develop a simple approach to derive ‘point’ (site specific) soil moisture using grid averaged soil moisture estimates.

Rescaling soil moisture grid product into ‘point’ value



4km Gridded Soil Moisture

Local Soil Texture



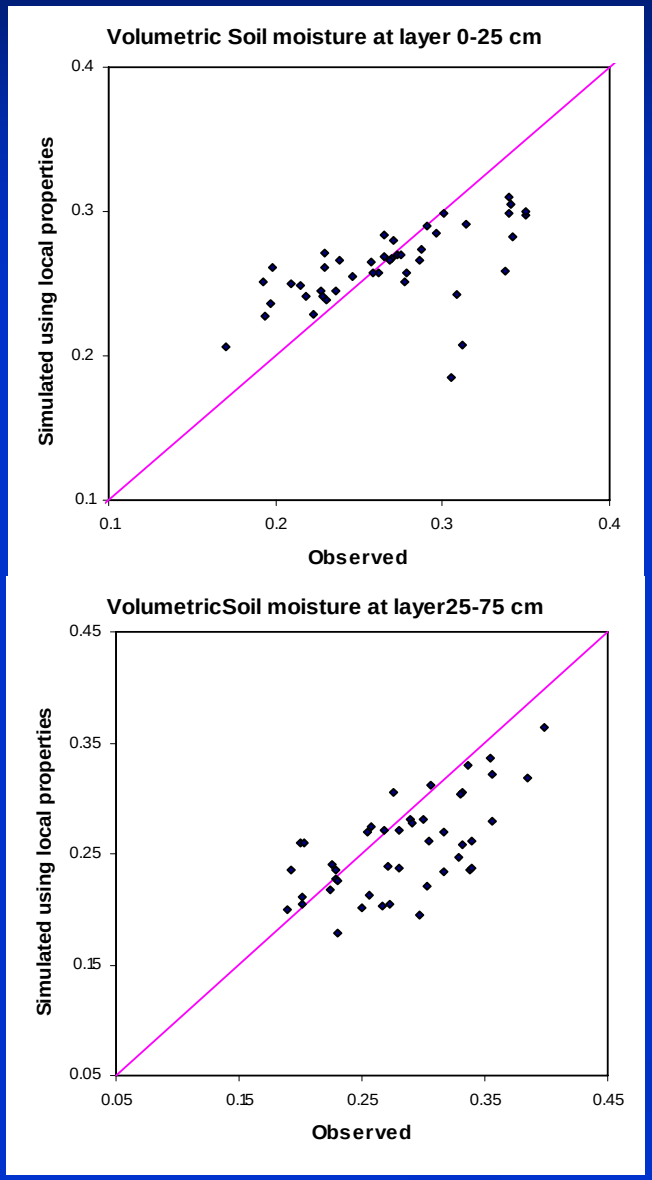
Site Specific Soil Moisture Estimates

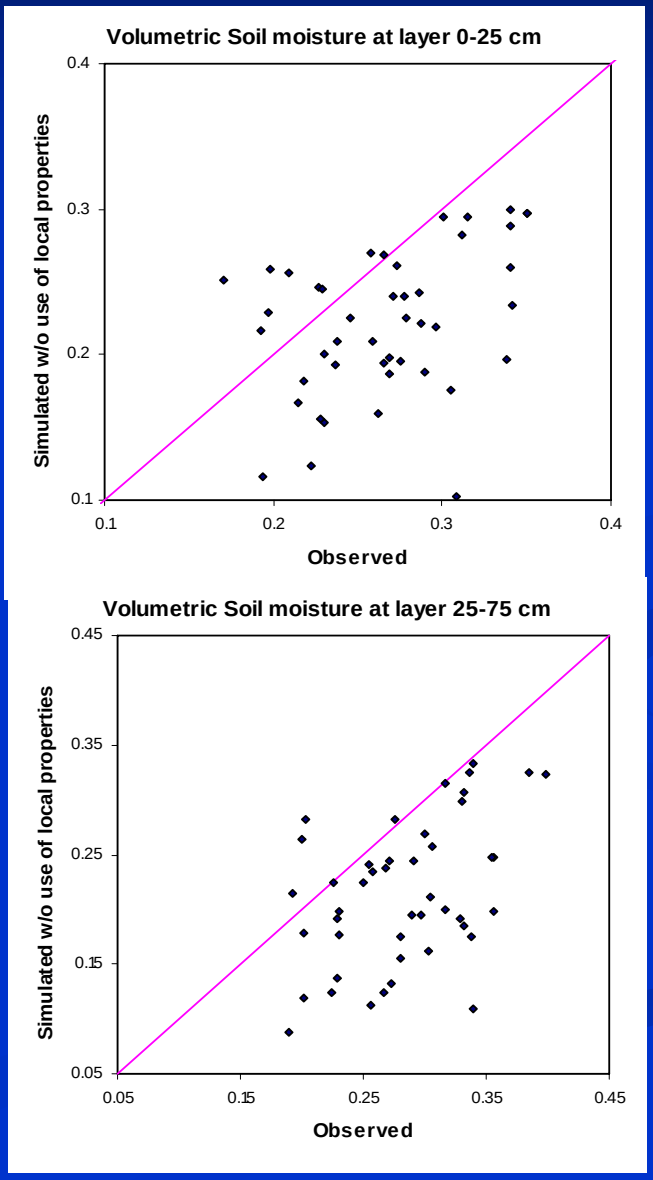
Approach:

1. *Account for inconsistency between grid and point soil properties,*
2. *Assume input fluxes are uniform over grid cell*

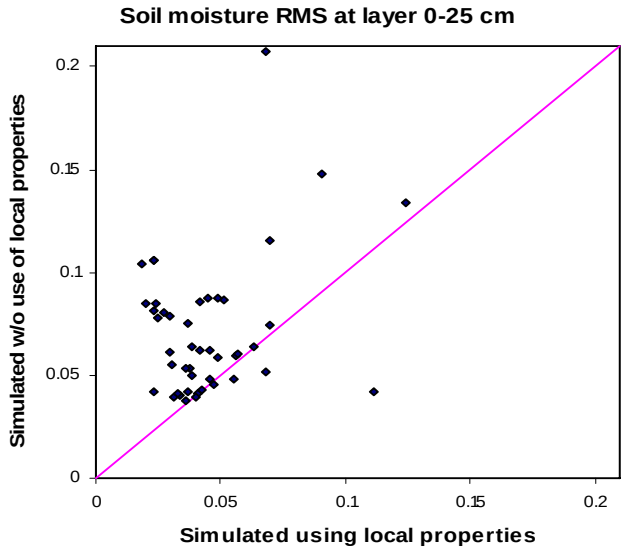
$$S_p = (S_g - \theta_{w,g}) \frac{\theta_{m,p} - \theta_{w,p}}{\theta_{m,g} - \theta_{w,g}} + \theta_{w,p}$$

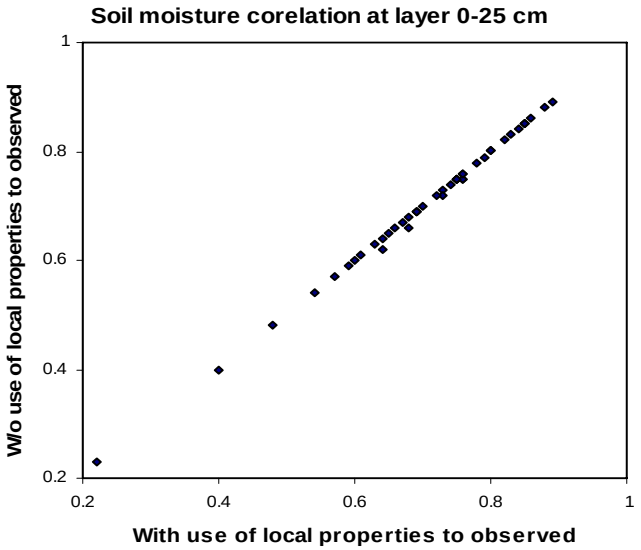
Soil moisture saturation index from pixel average and point simulations at 48 Oklahoma sites

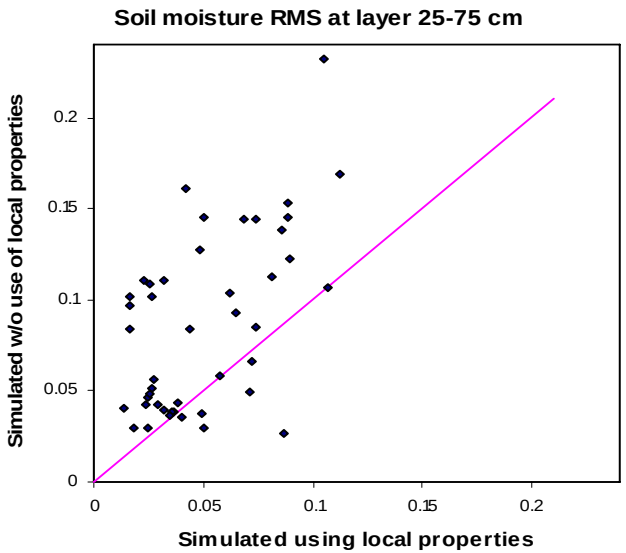


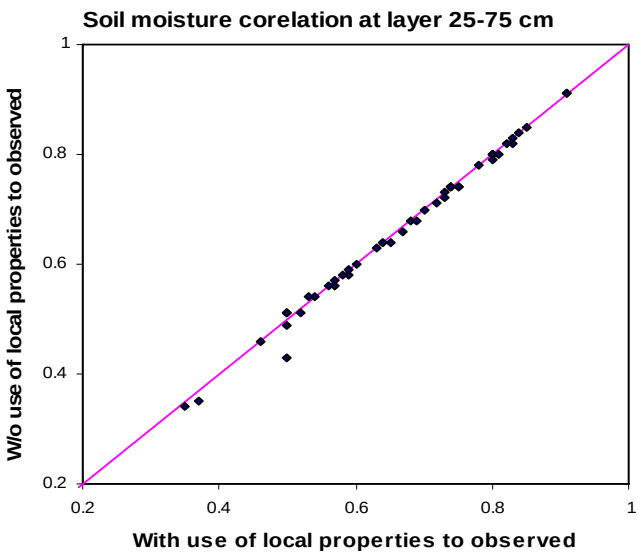


RMSE and R of saturation index from pixel average and point simulations at 48 Oklahoma sites

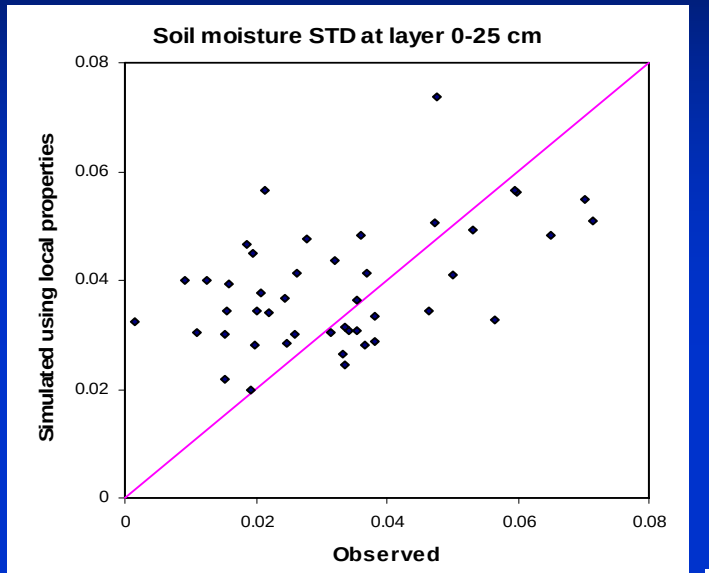


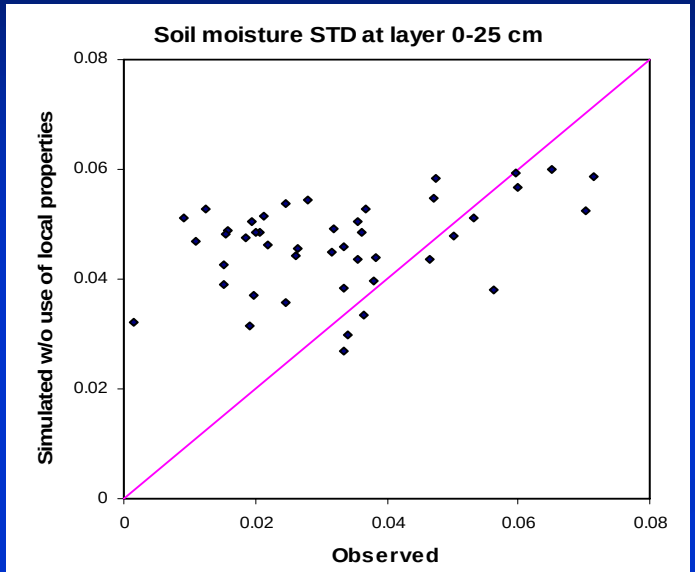


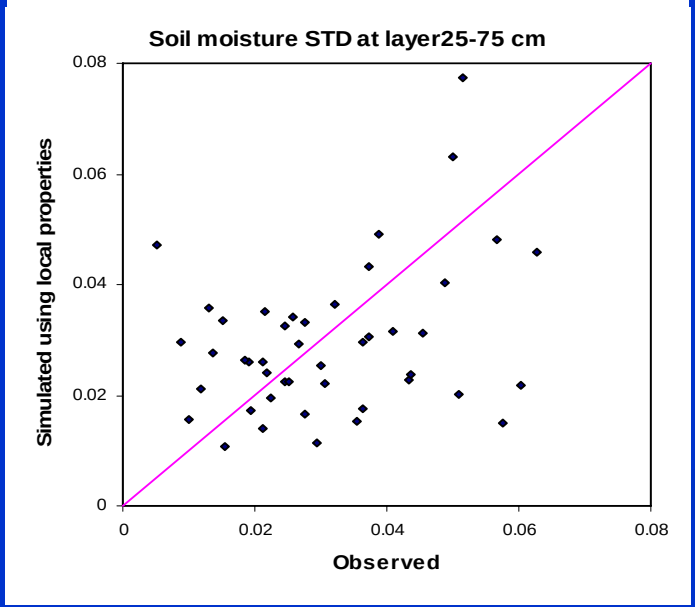


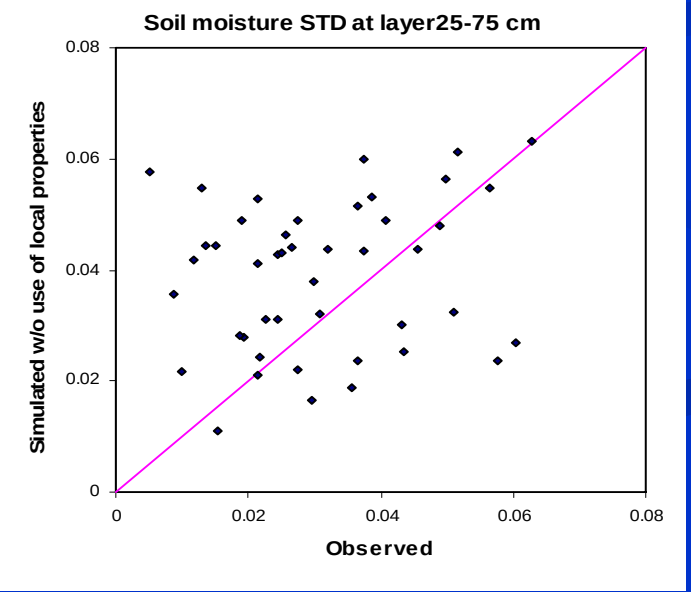


STD of saturation index from pixel average and point simulations at 48 Oklahoma sites









Comparison of soil moisture error statistics from pixel and 'point' scale simulations

Simulation scale	RMSE	Bias	AbsError	R
Upper soil layer, 00-25 cm				
Pixel	0.071	0.045	0.064	0.71
Point	0.045	0.005	0.038	0.71
Lower soil layer, 25-75 cm				
Pixel	0.086	0.068	0.080	0.67
Point	0.050	0.027	0.044	0.67

SUMMARY

- A simple rescaling procedure leads to about two-fold improvement of soil saturation accuracy at a site specific scale
- Local scale simulations can be performed as a post processing step at desired locations with available local soil properties (MOS-type)