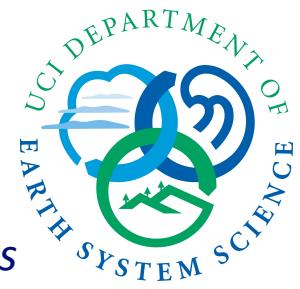
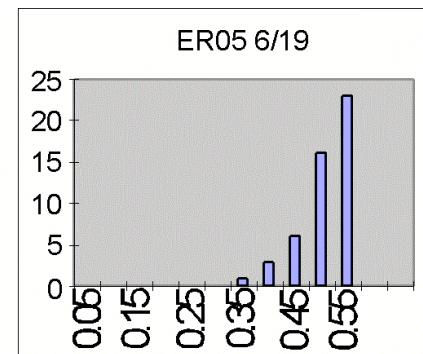
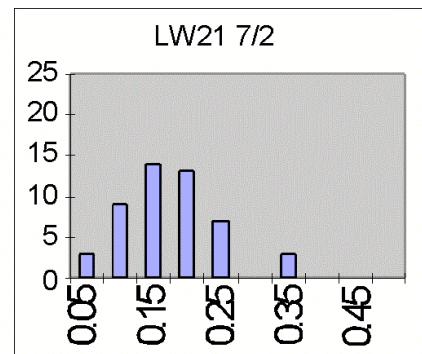
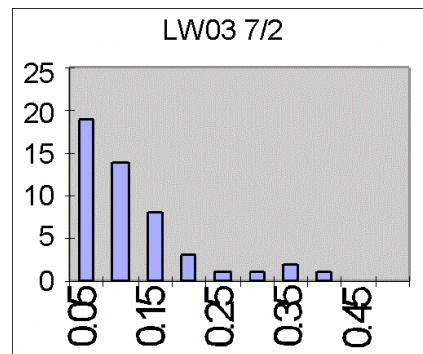


Soil Moisture Variability From Plot to Footprint Scale Results From SGP97, SGP99, SMEX02

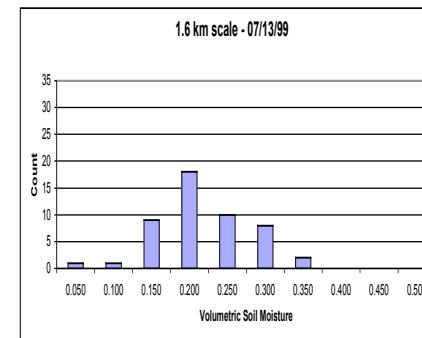
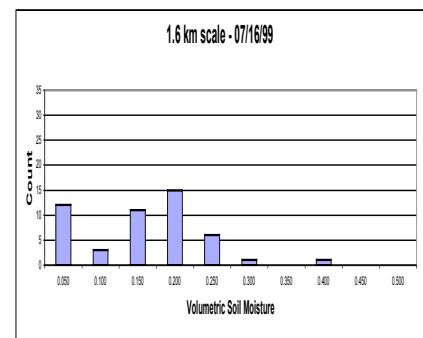


Evolution of Soil Moisture Distributions at Increasing Scales

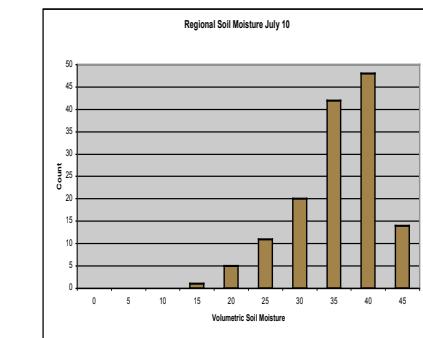
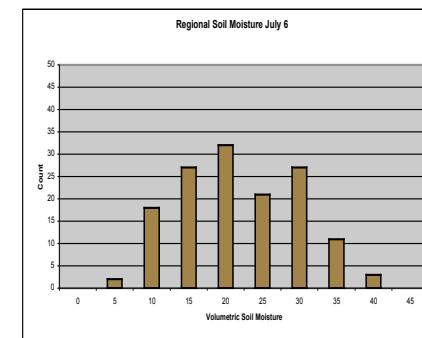
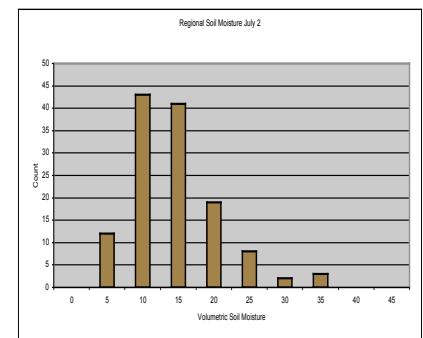
**SGP97
0.8 km**



**SGP99
1.6 km**

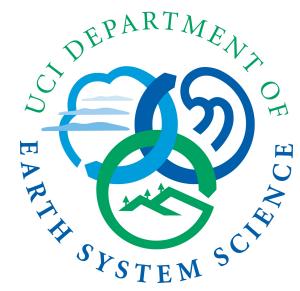


**SMEX02
50 km**

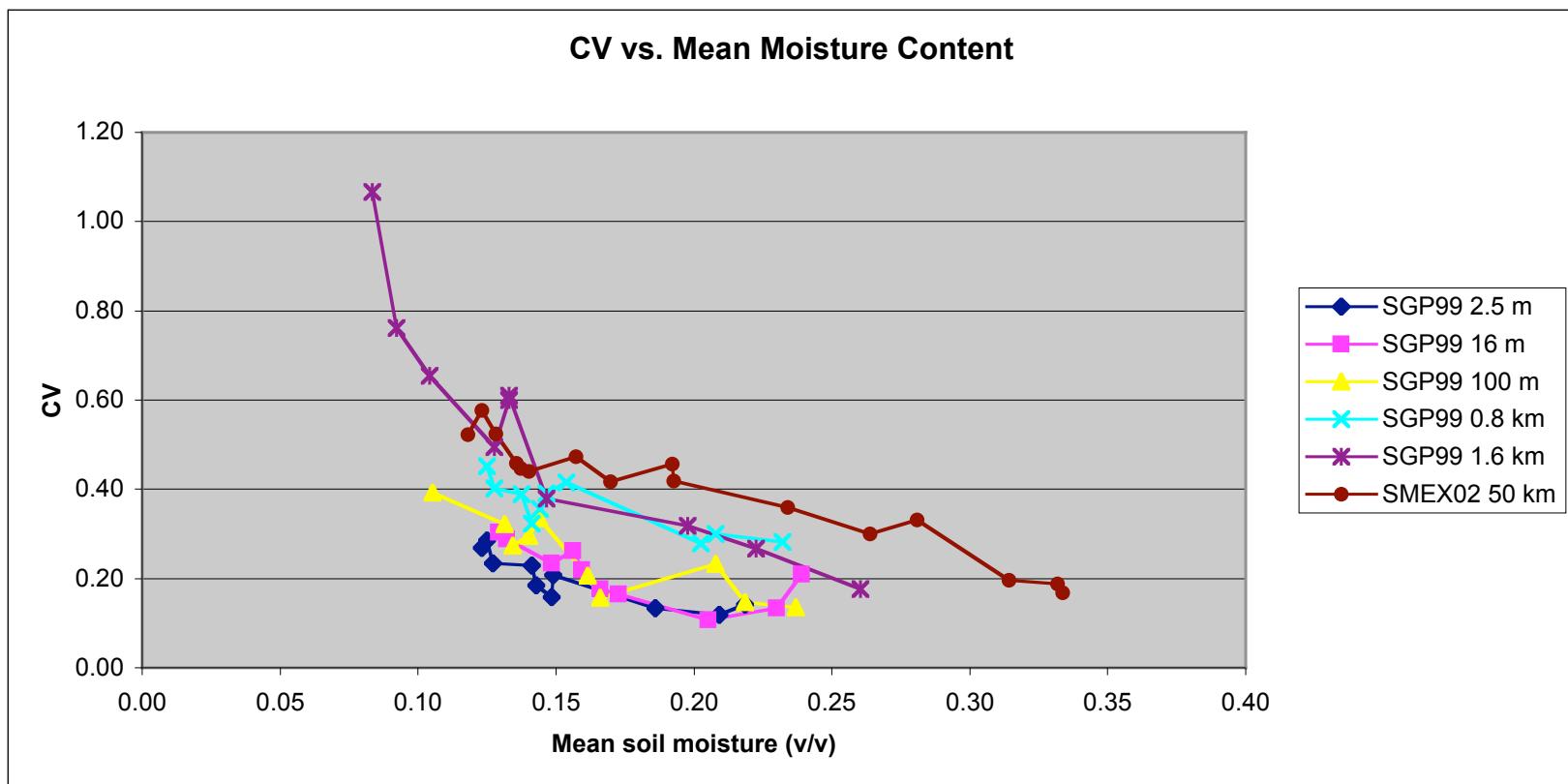


Famiglietti et al., 2008

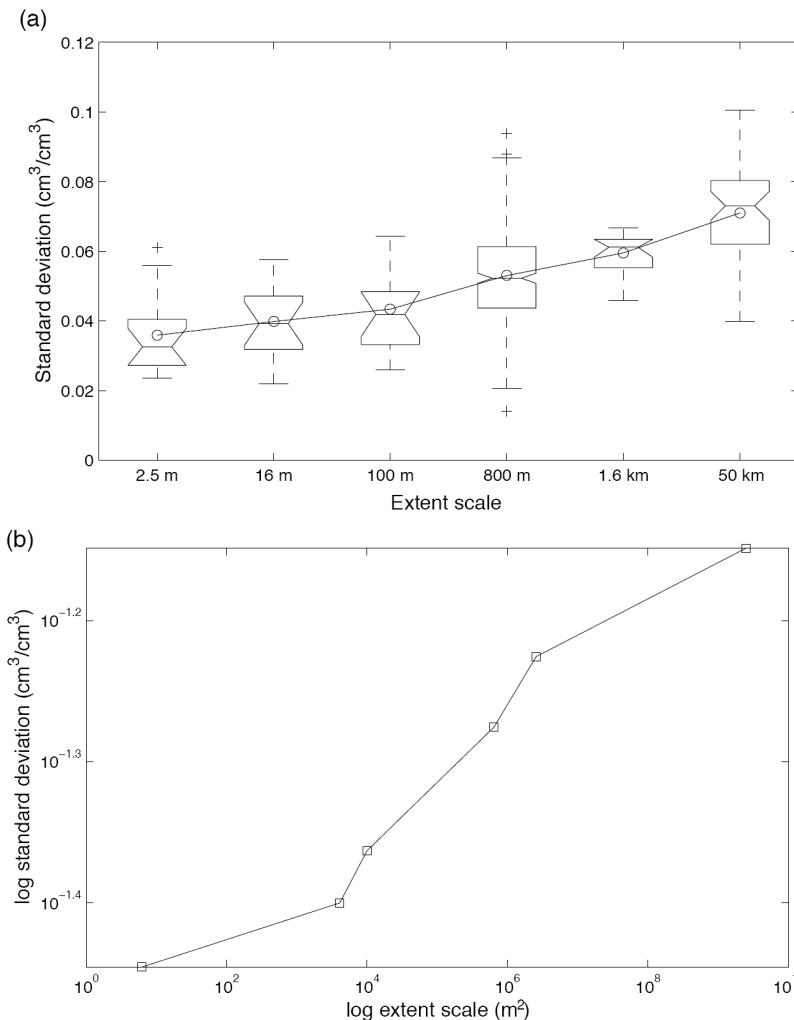
Soil Moisture Variability From Plot to Footprint Scale Results From SGP97, SGP99, SMEX02



Increasing Variability with Increasing Spatial Scale

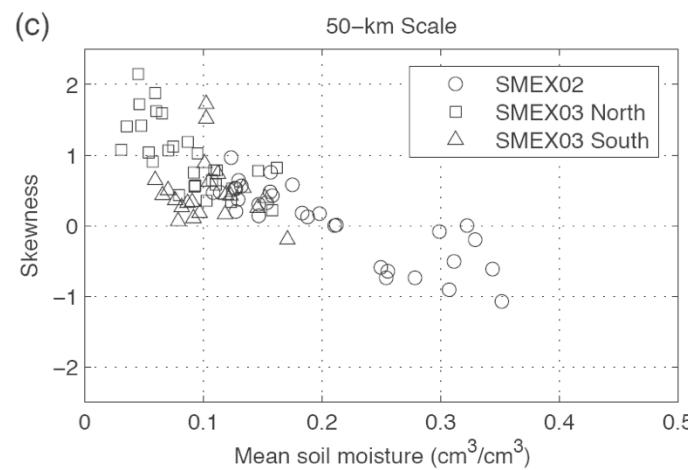
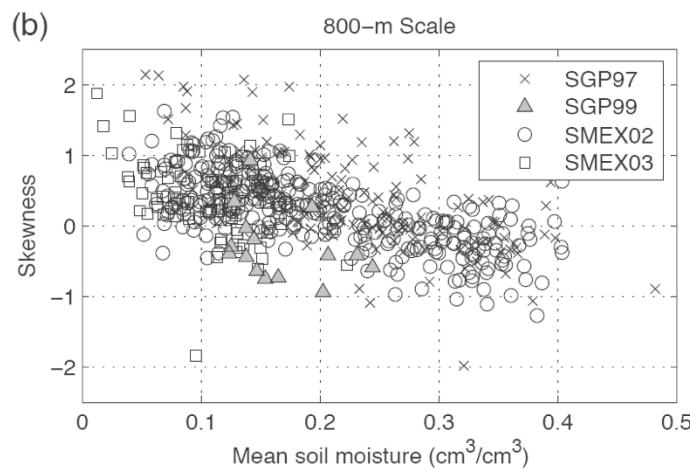
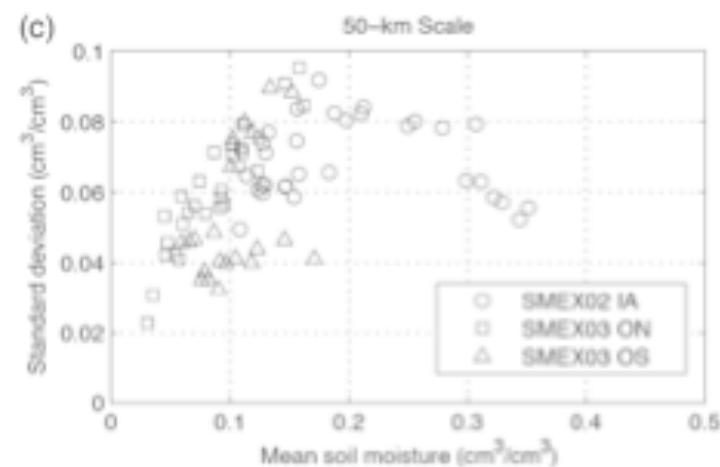
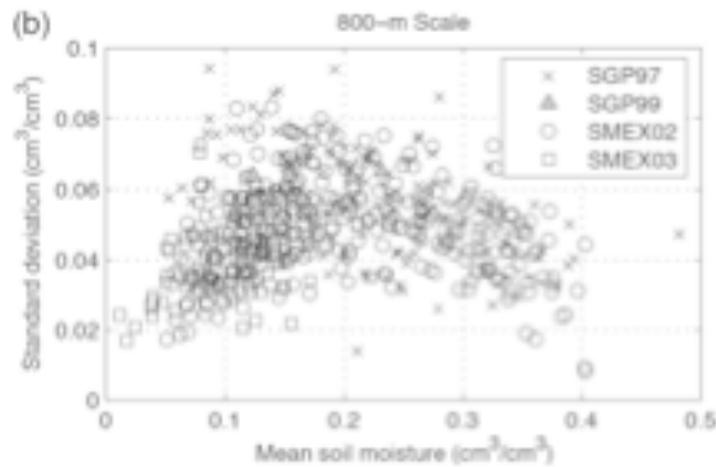
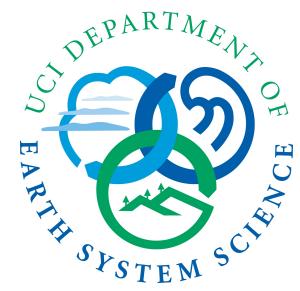


Soil Moisture Standard Deviation Across Scales



SGP97-SMEX03

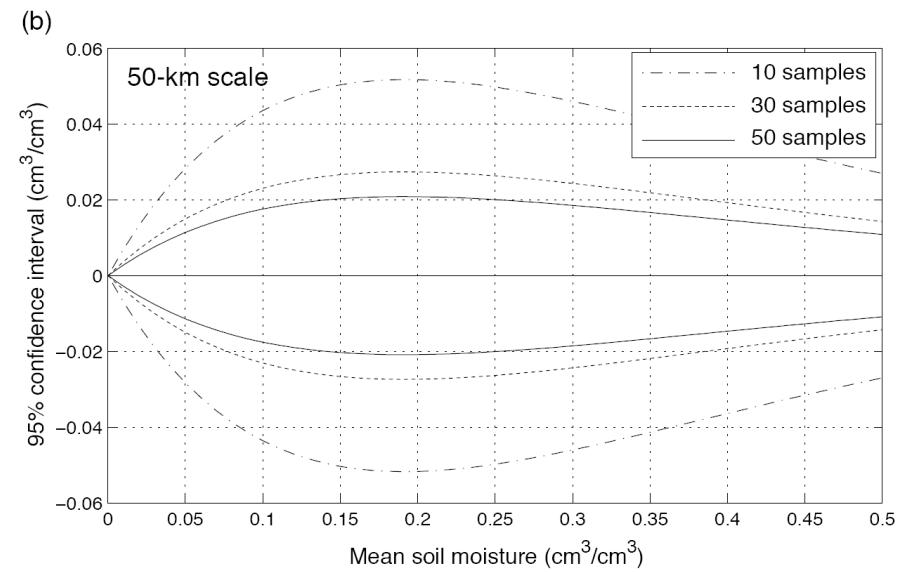
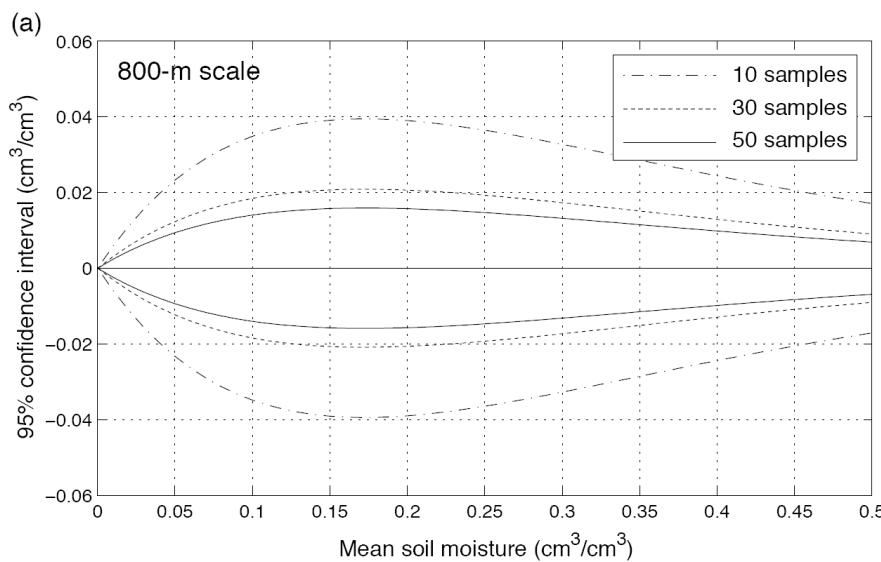
Soil Moisture Standard Variability Across Scales



CHARACTERIZING IN SITU SAMPLING ERROR

- Confidence interval of the validation data from ground samples can be estimated using the empirical function of soil moisture standard deviation and the Student's t-distribution.

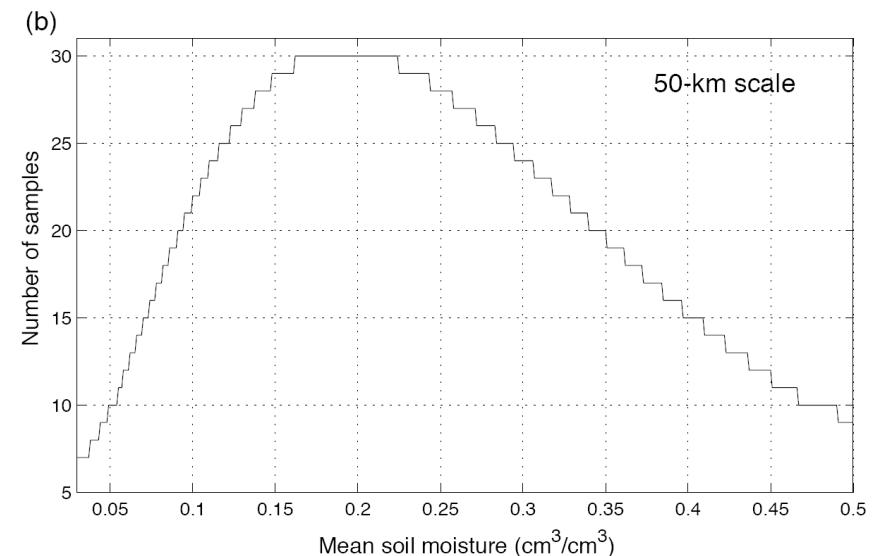
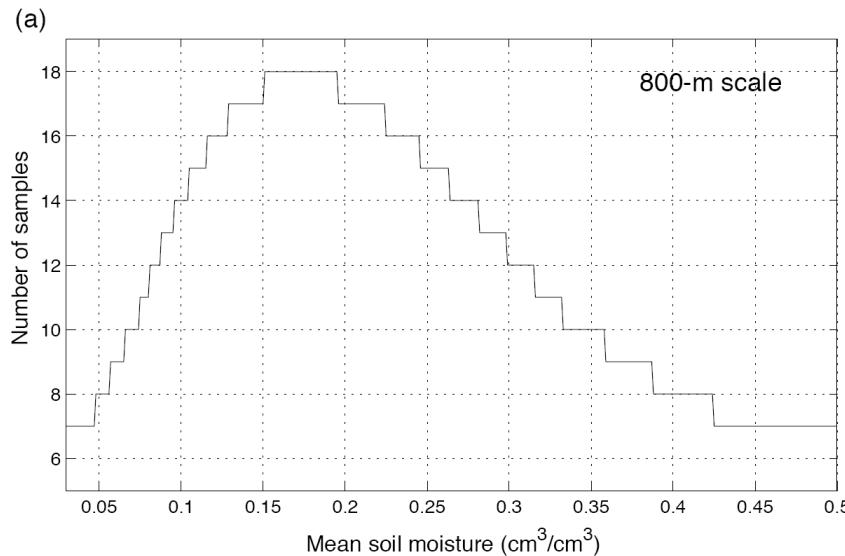
$$\bar{X} + t_{0.025, N} \cdot \frac{\sigma}{\sqrt{N}} < \mu < \bar{X} + t_{0.975, N} \cdot \frac{\sigma}{\sqrt{N}}$$



CHARACTERIZING IN SITU SAMPLING ERROR

- Number of ground samples required can be estimated using the empirical function of soil moisture standard deviation and the Student's t-distribution.

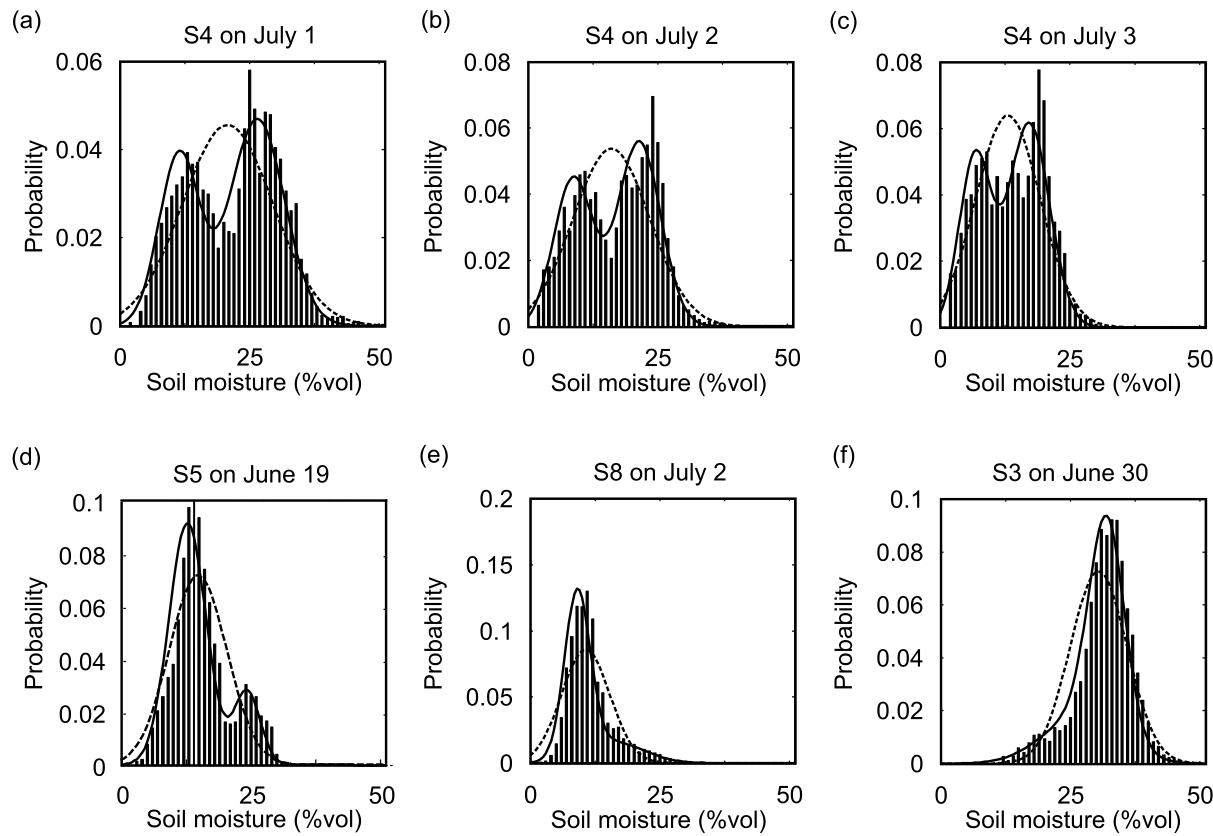
$$N = \left(t_{0.975, N} \cdot \frac{\sigma}{0.03} \right)^2$$



CHARACTERIZING VARIABILITY IN MODELS



- Gaussian mixture model (multi-modal) vs. single Gaussian (uni-modal)



CHARACTERIZING VARIABILITY IN MODELS

- Gaussian mixture model (multi-modal) vs. single Gaussian (unimodal)

