



# Covariance and Variograms: More on Soil Moisture Statistics

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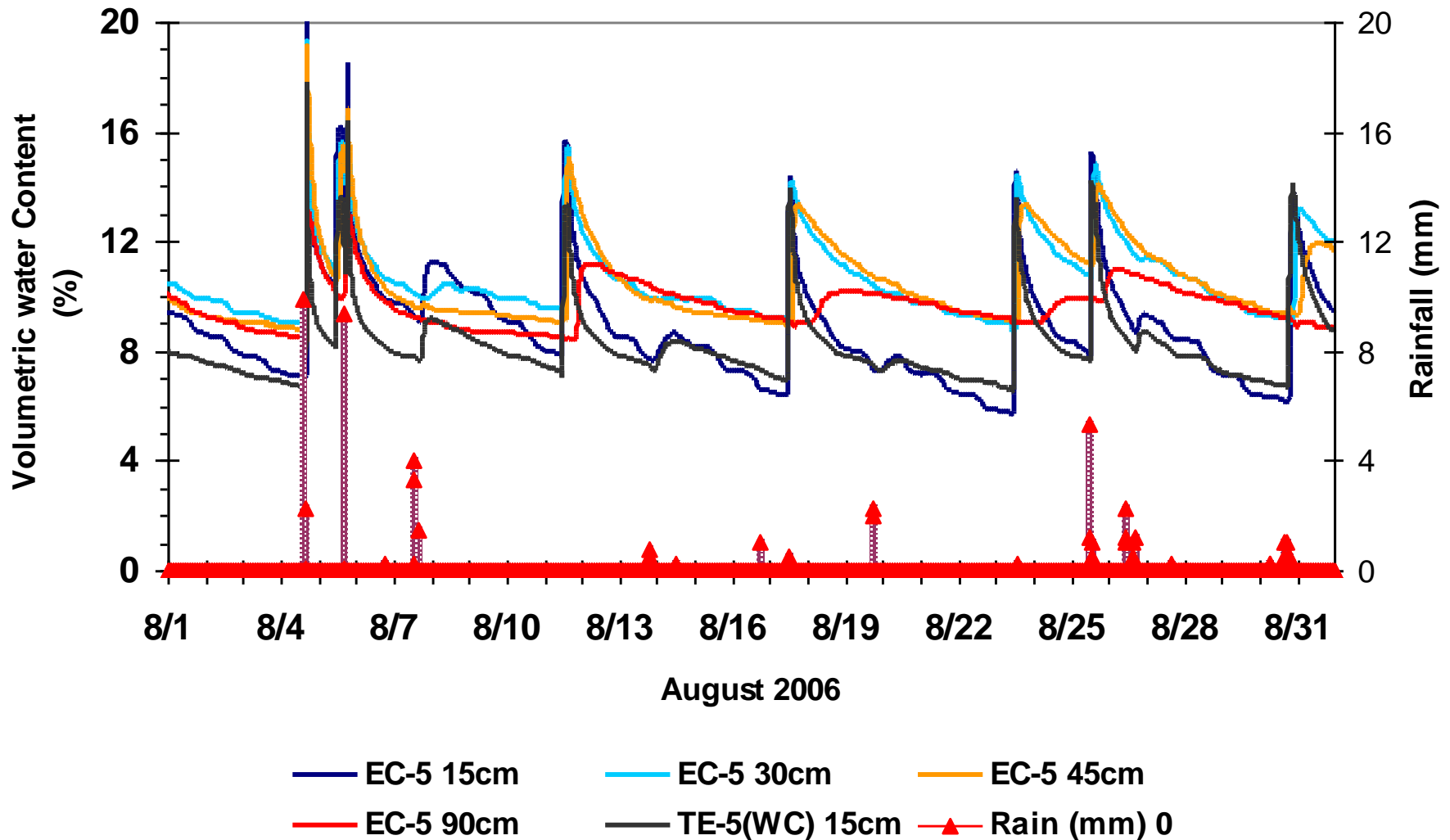
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# Why two probes in the same field might read differently

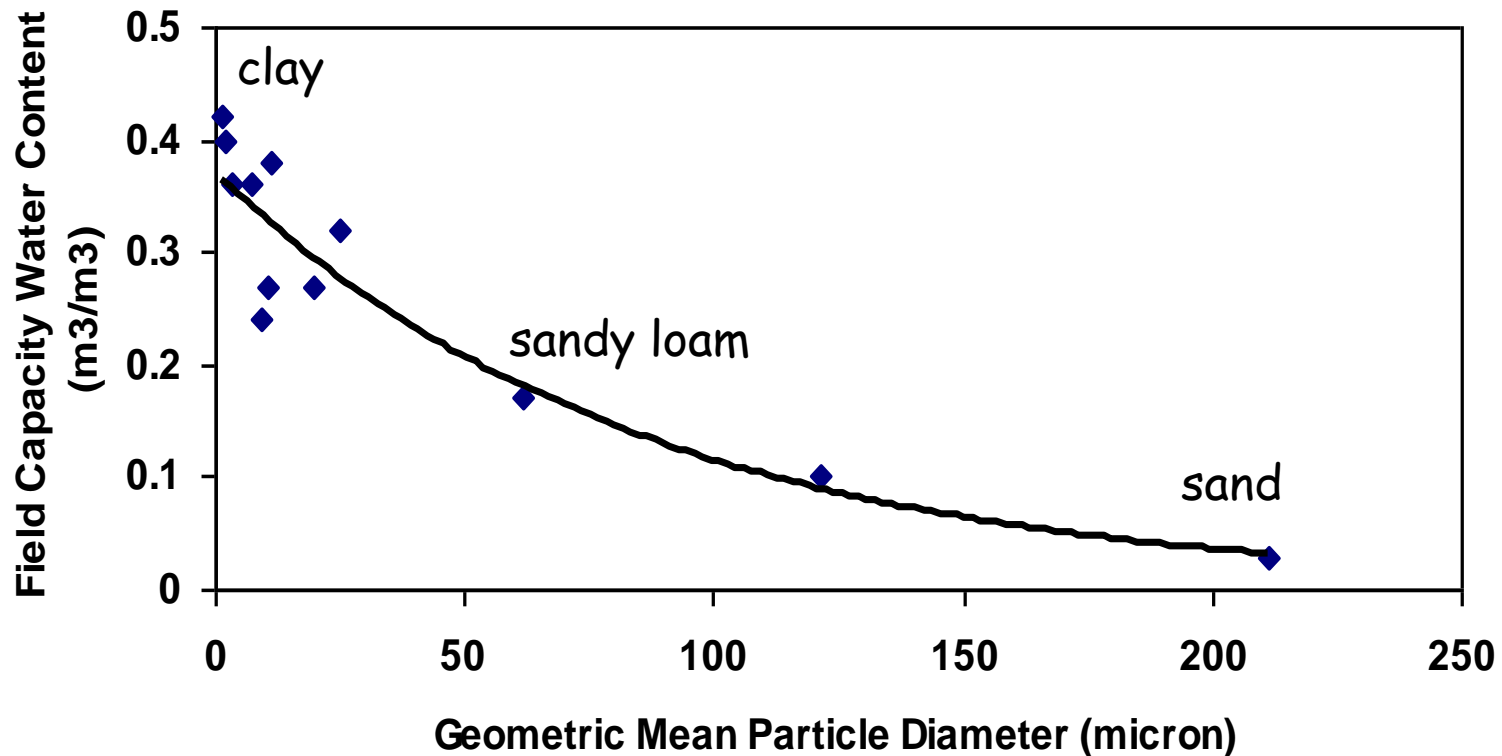
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- Electronic or calibration problems
- Installation problems
- Soil properties vary in space and time

# Field Capacity: The water content of a soil profile 2-3 days after a heavy rain or irrigation



# Field capacity water content depends on soil texture

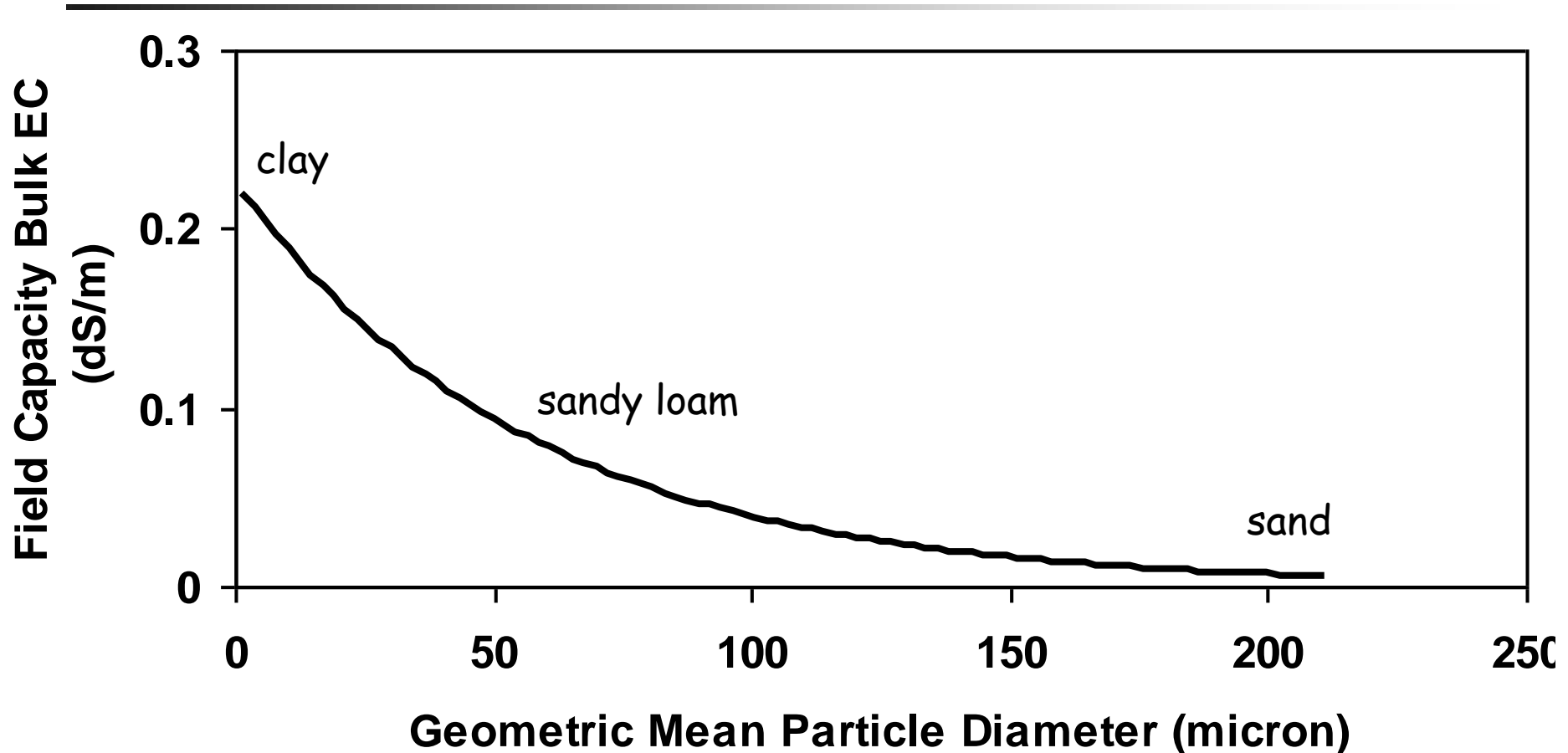


# Soil moisture variation can give information about texture

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- Source of variation when soil is at field capacity or permanent wilt
- Source of variation if texture reduces permeability

# Bulk EC can also be a covariate



# EC Maps Can Show Texture Distributions

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- Field capacity water content is determined by texture
- Relative bulk electrical conductivity is determined by water content
- The  $EC_b$  map therefore shows water content and texture distributions

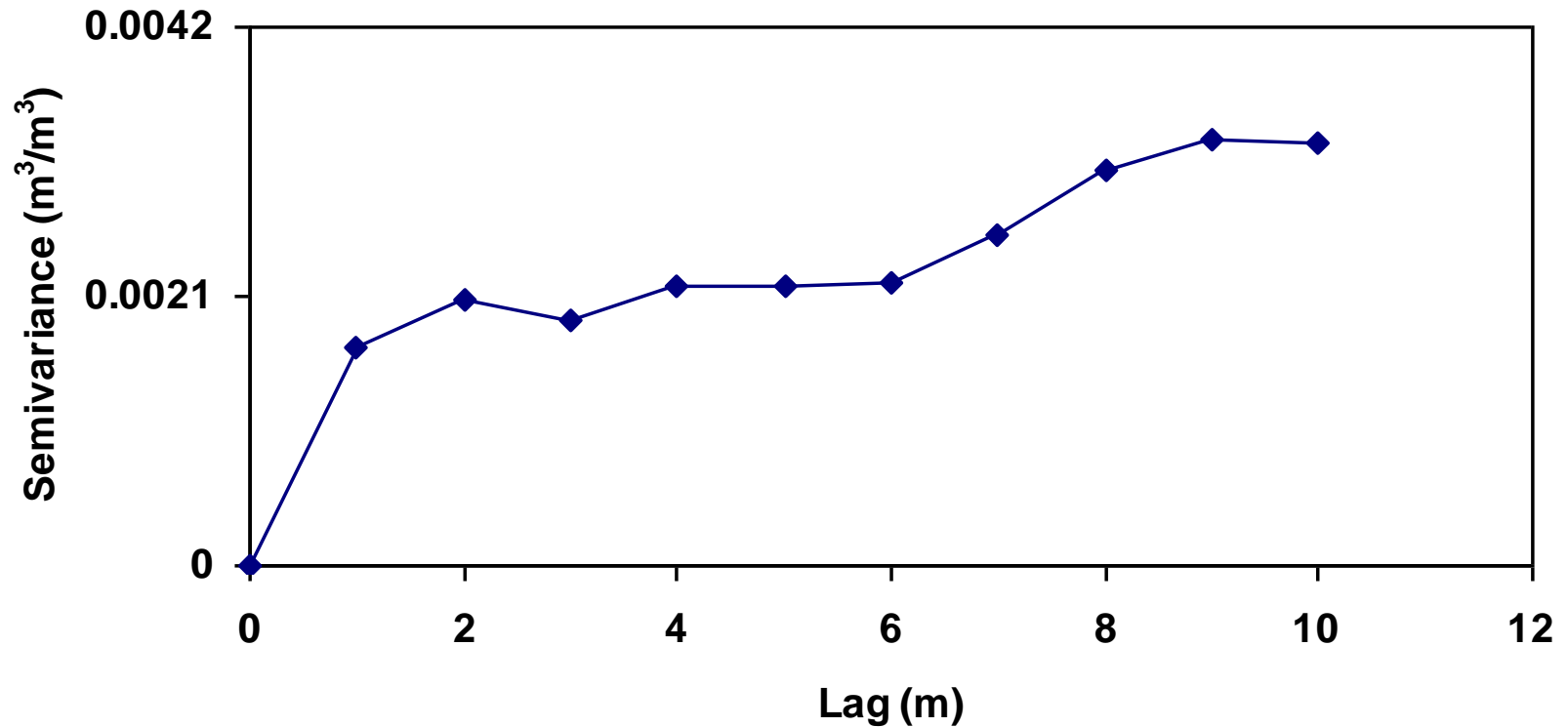
# Soccer field data, again: spatial distribution of variance

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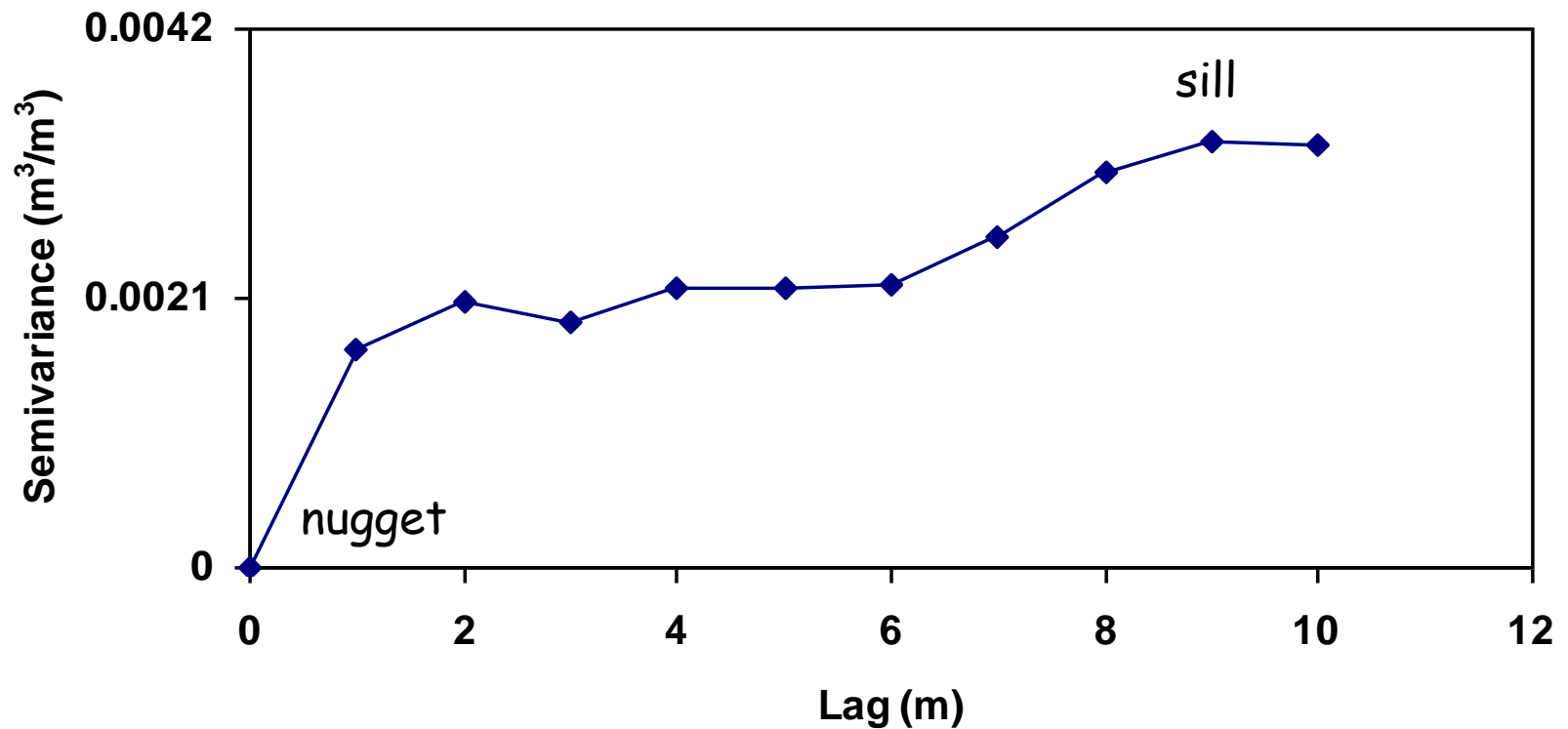
- How do I sample to properly represent the field?
- Does my sampling scheme affect the variance (or standard deviation) I get?
- Are samples from the same spot more similar than more widely spaced samples?



# Soccer field semivariogram



# Soccer field semivariogram



# Conclusions

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- If water content is properly measured, variations give information about soil properties
- Texture and field capacity water content are correlated

# Conclusions

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- Texture and bulk EC are correlated. Bulk EC and water content are correlated.
- Soil moisture variation is not random. More closely spaced points have lower variance than more widely spaced.