

# CALIBRATION OF SMAPVEX1 2 SURFACE SOIL MOISTURE PROBES

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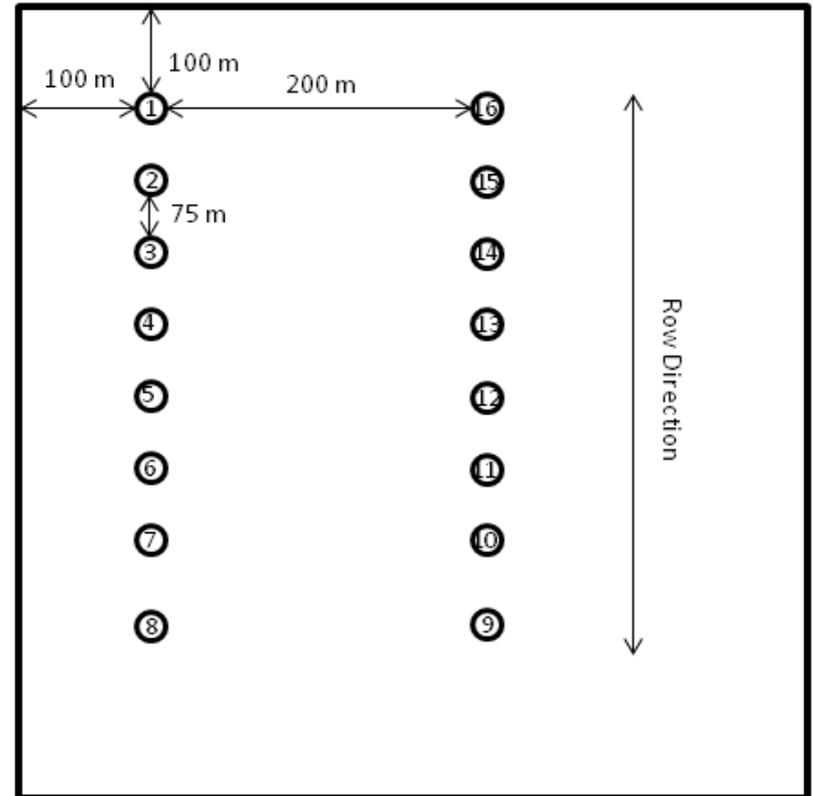
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# Outline

- Sampling procedure
- Calibration techniques: Goal RMSE <  $0.04\text{m}^3\text{m}^{-3}$ 
  - General Equation
  - Soil Texture approaches
  - Land cover
  - Individual Fields
- Final calibration procedure

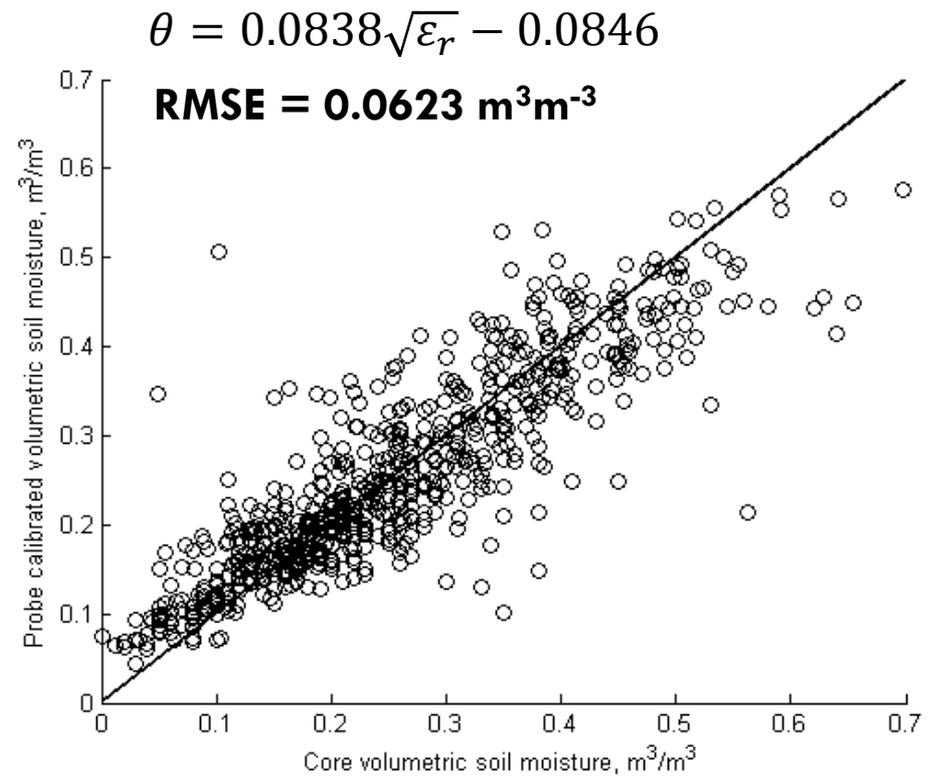
# Sampling Procedure: A reminder

- A core was collected at each sampling point
- Three hydra probe measurements taken
- Volumetric water content determined – basis for calibration
- 702 samples collected



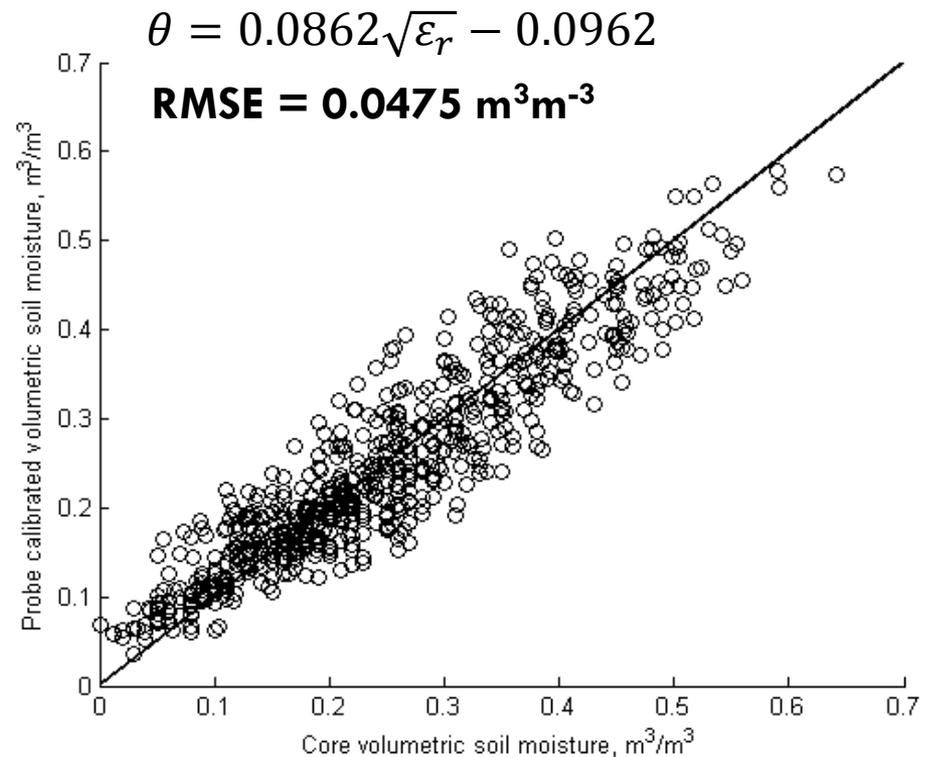
# General Equation

- Linear regression conducted between the core volumetric water content and the square root of the hydra probe real dielectric ( $\sqrt{\epsilon_r}$ )



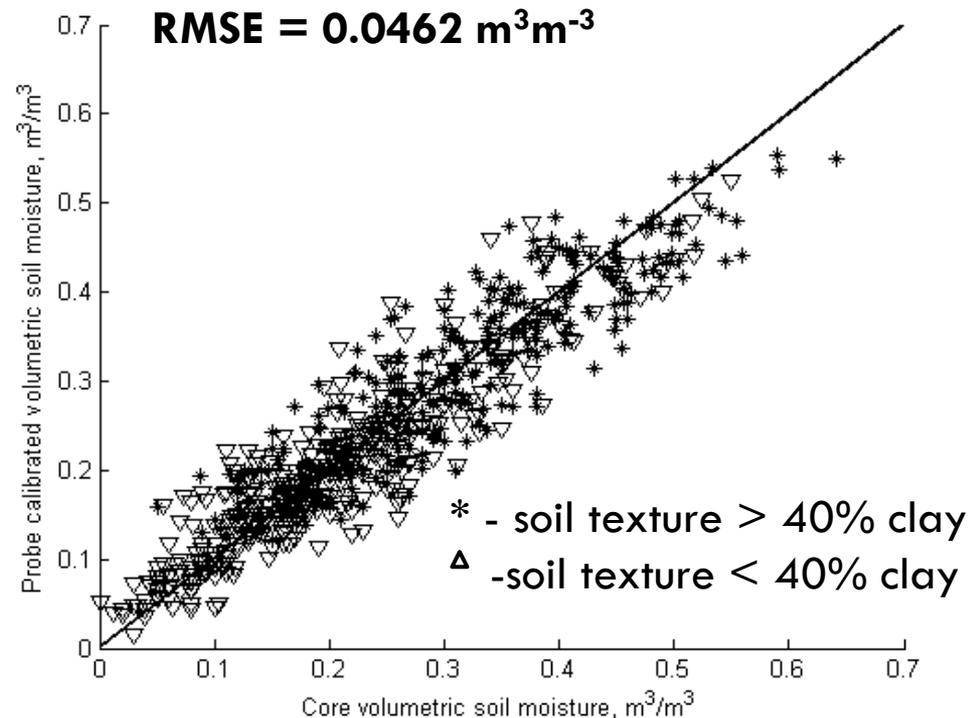
# General Equation

- 30 outliers removed (23 fields, 11 coarse textured, 19 fine texture)
- New general equation
- Outliers were removed for all remaining calibrations



# Soil Texture Threshold

- Core samples were classified as coarse or fine texture, using 40% clay content threshold
- Individual calibration equations for fine and coarse soils



# Soil Texture – Using a Soil Map

- Surface soil texture for all core locations from AAFC Soils Landscape of Canada database
- Dominant soil texture class determined for each field

Soil Texture	Number of Fields	RMSE (m <sup>3</sup> m <sup>-3</sup> )
Clay	25	0.0546
Loamy Fine Sand	6	0.0326
Fine Sandy Loam	7	0.0341
Loamy Very Fine Sand	6	0.0521
Loam	7	0.0450
Clay Loam	2	0.0520
Silty Clay Loam	1	0.0389
Silt Loam	1	0.0423
<b>Average</b>		<b>0.0440</b>

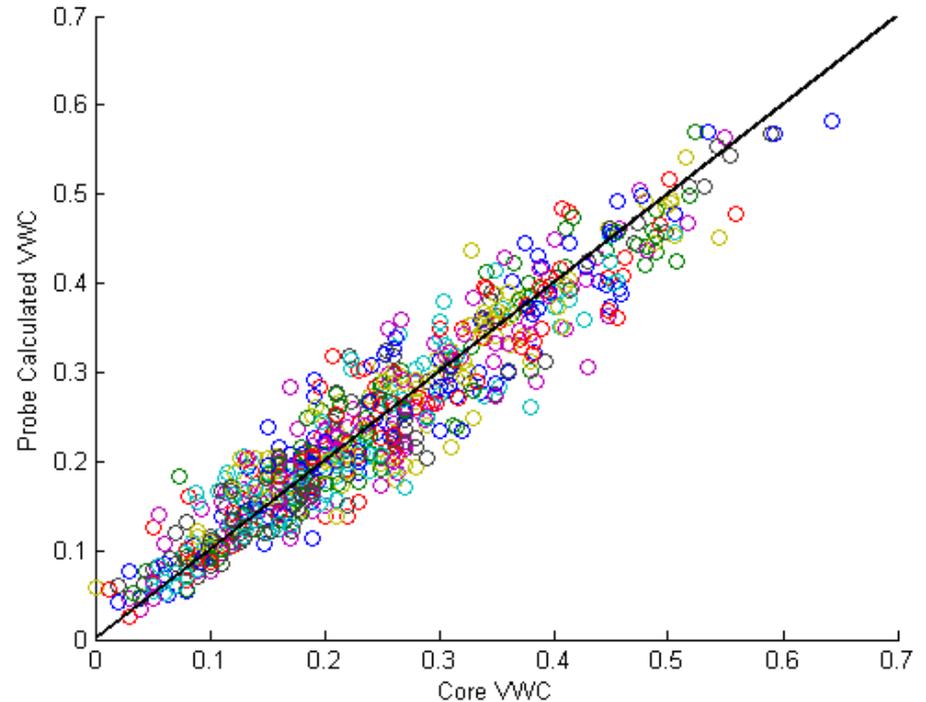
# Vegetation Land Cover

- Fields were categorized based on vegetation land cover
- Calibration equation developed for each vegetation class

Land Cover	Number of Fields	RMSE (m <sup>3</sup> m <sup>-3</sup> )
Beans	19	0.0477
Canola	6.5	0.0491
Corn	8.5	0.0325
Pasture	5	0.0338
Wheat	16	0.0460
<b>Average</b>		<b>0.0418</b>

# Individual Fields

- Calibration equation developed for each field
- RMSE values ranged 0.0121 to 0.0572  $\text{m}^3\text{m}^{-3}$
- Overall RMSE of 0.0374  $\text{m}^3\text{m}^{-3}$



# Final Calibration

- Hydra probe data was calibrated using field-based calibration equation
- Exceptions: 5 fields where the regression model was not statistically significant
  - Three fields had too few core samples
  - Two fields had poor correlation between probe and core measurements
- These five fields were calibrated using the general equation

# Acknowledgments

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- Field and lab crews (too numerous to mention individually)
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