

Soil Moisture Monitoring Networks in Saskatchewan and Southern Ontario: Network Validation

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Outline

- Network Locations and Design
- Network application for validation of satellite soil moisture retrievals

Ontario and Saskatchewan Paired Soil Moisture Networks

- Two soil moisture monitoring networks 50X50 Km resolution
- Sampling at 5, 20 and 50cm depths



- Temporal Frequency :
Hourly
- Variables Observed:
Soil temperature
Soil Moisture
Precipitation

SOIL TEXTURES IN ONTARIO OBSERVATORY

N

1:500,000

0 2.5 5 10 15 20 25 Kilometers

Legend

- Study Sites
- Cities/Towns
- Rivers

Soil Textures

- Organic
- Unclassified
- Loam
- Sand Loam
- Clay Loam
- Silt Loam

KEY MAP OF SOUTHERN ONTARIO



Data Sources:

Agricorp (2006)
Ontario Ministry of Natural Resources (2005)
Ontario Ministry of Agriculture, Food and
Rural Affairs (2004)





CanEX SM 2010 Kenaston Study Area

N

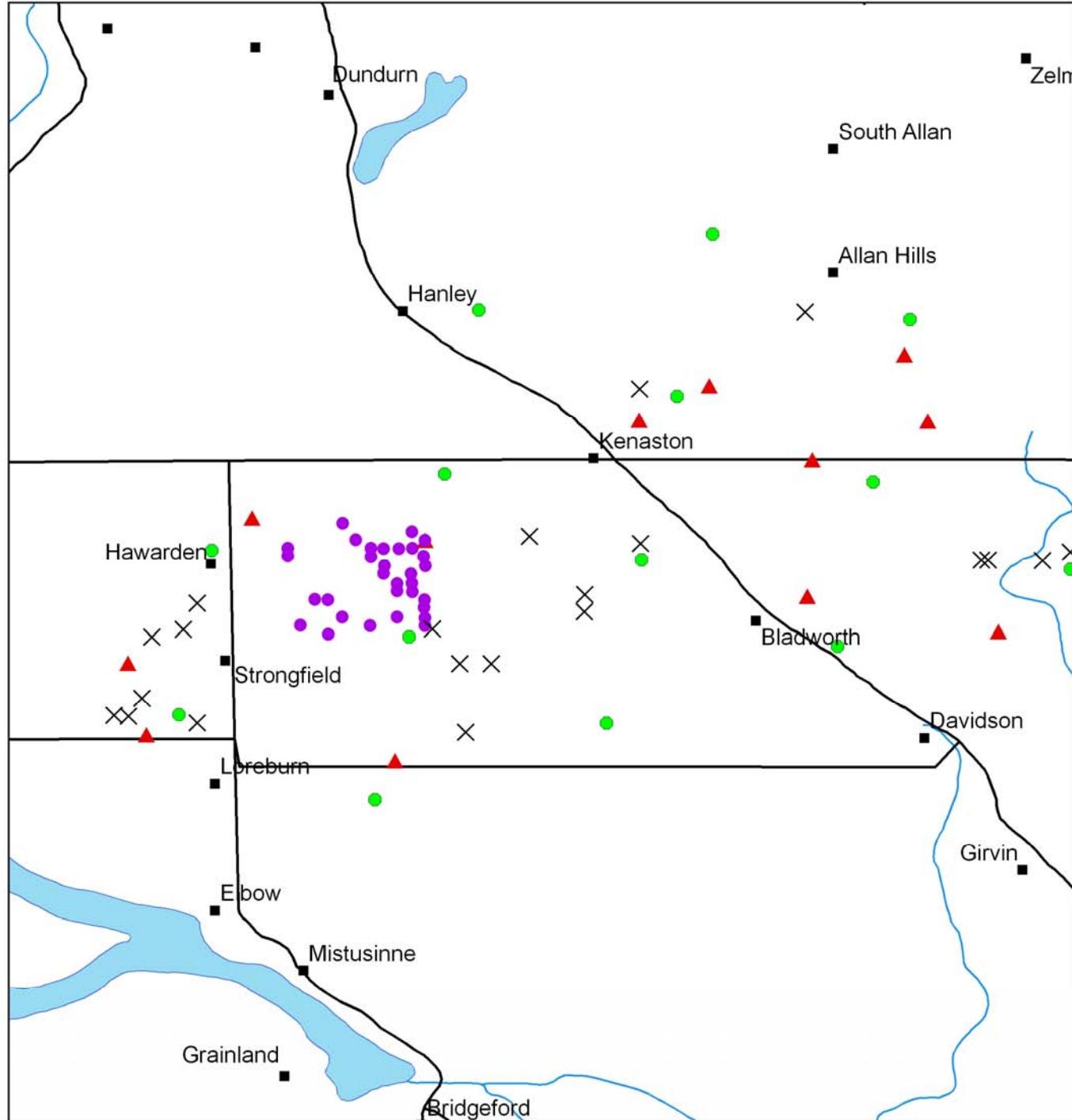
1:500,000

0 2 4 8 12 16 20 Kilometers

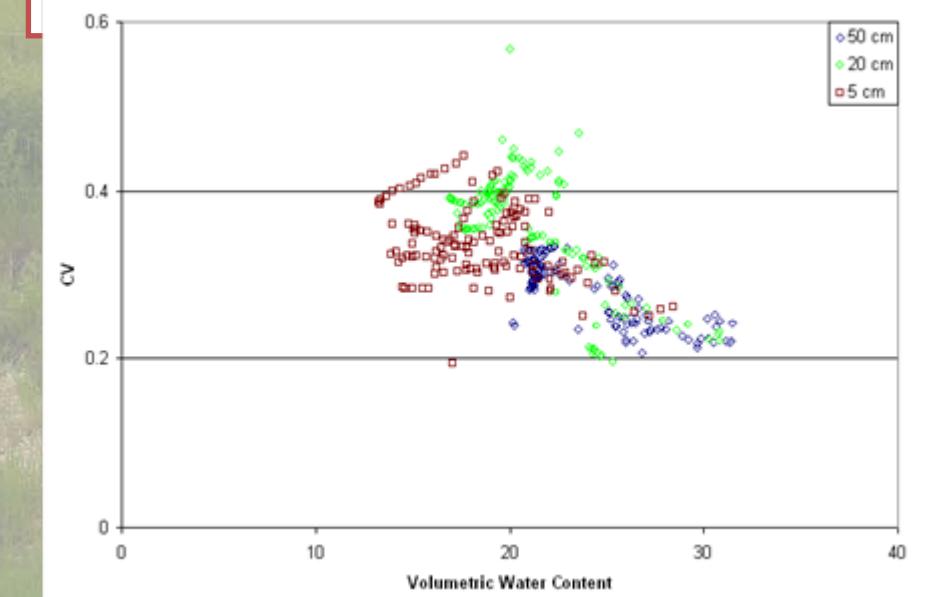
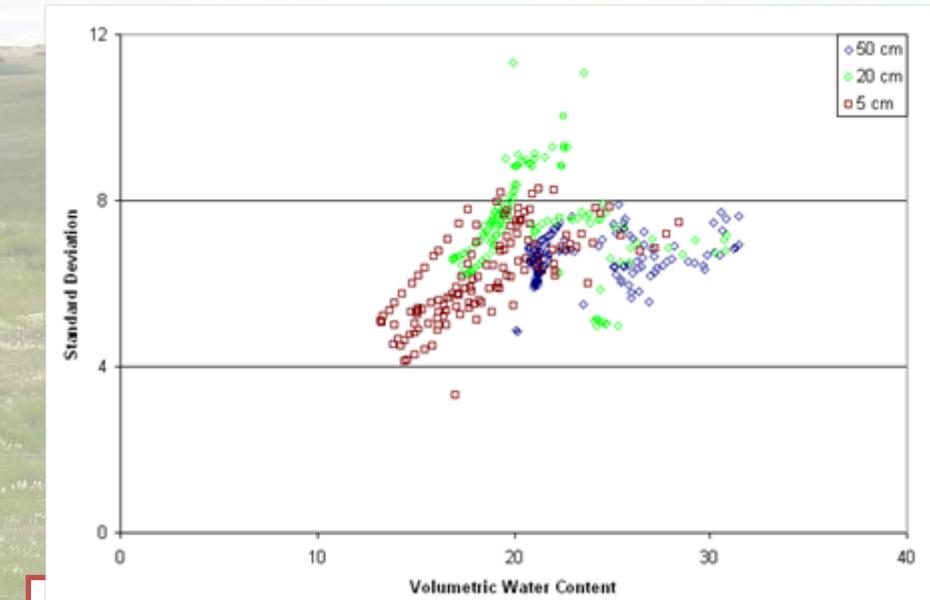
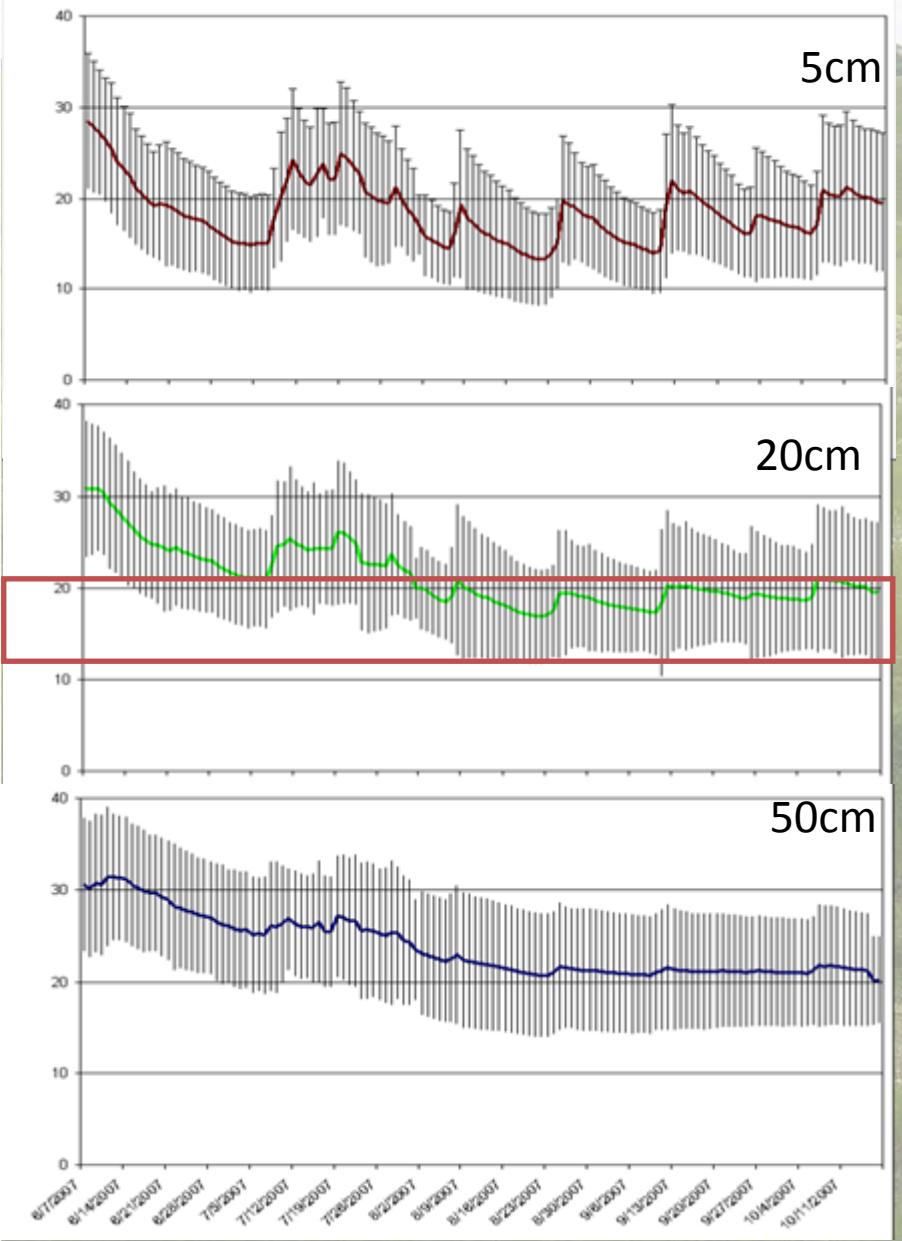
Legend

- SMOS Centres
- × Manual Survey Sites
- EC Sites
- ▲ U of G Sites
- Towns
- Highways
- Rivers
- Lakes

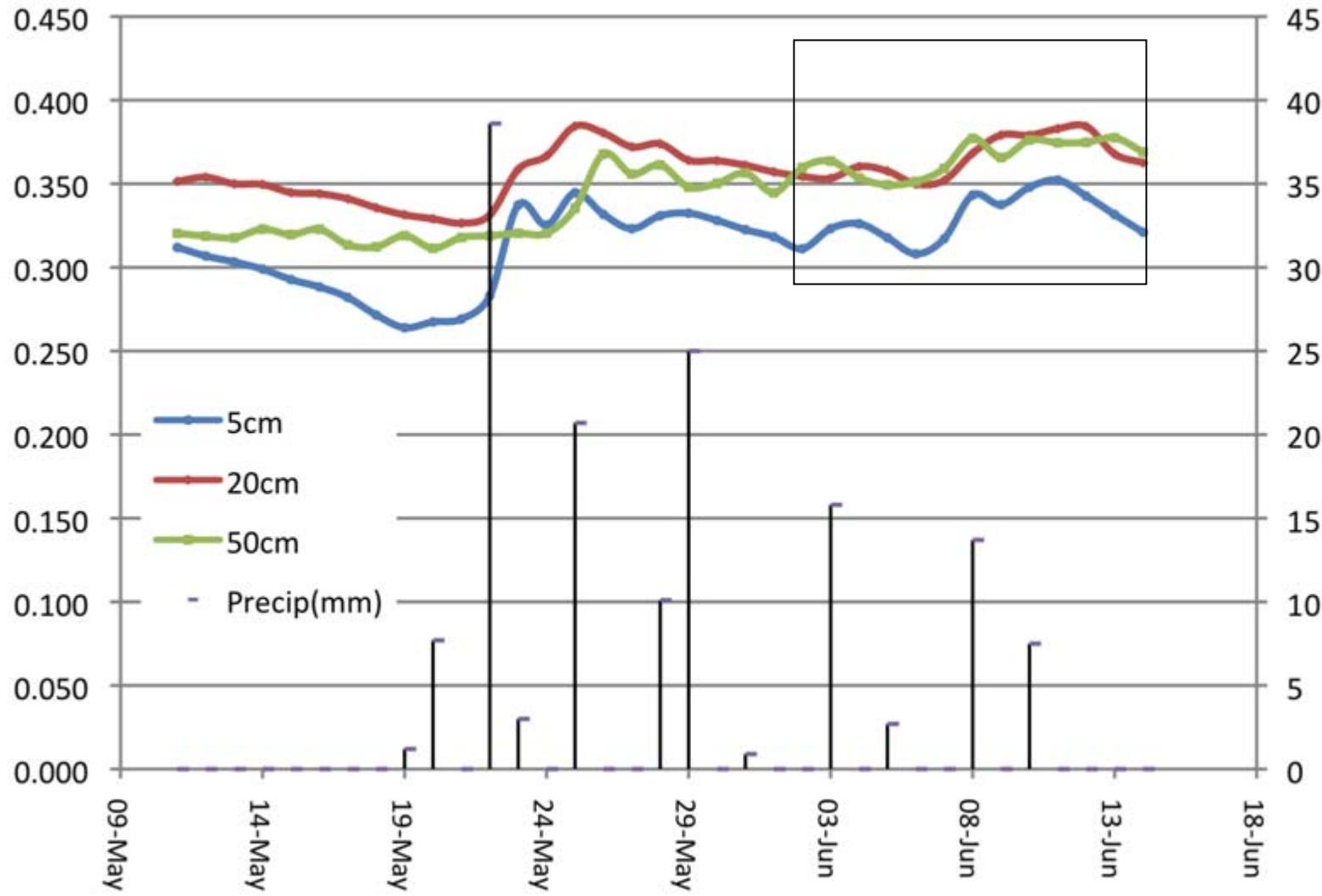
KEY MAP OF SOUTHERN SASKATCHEWAN

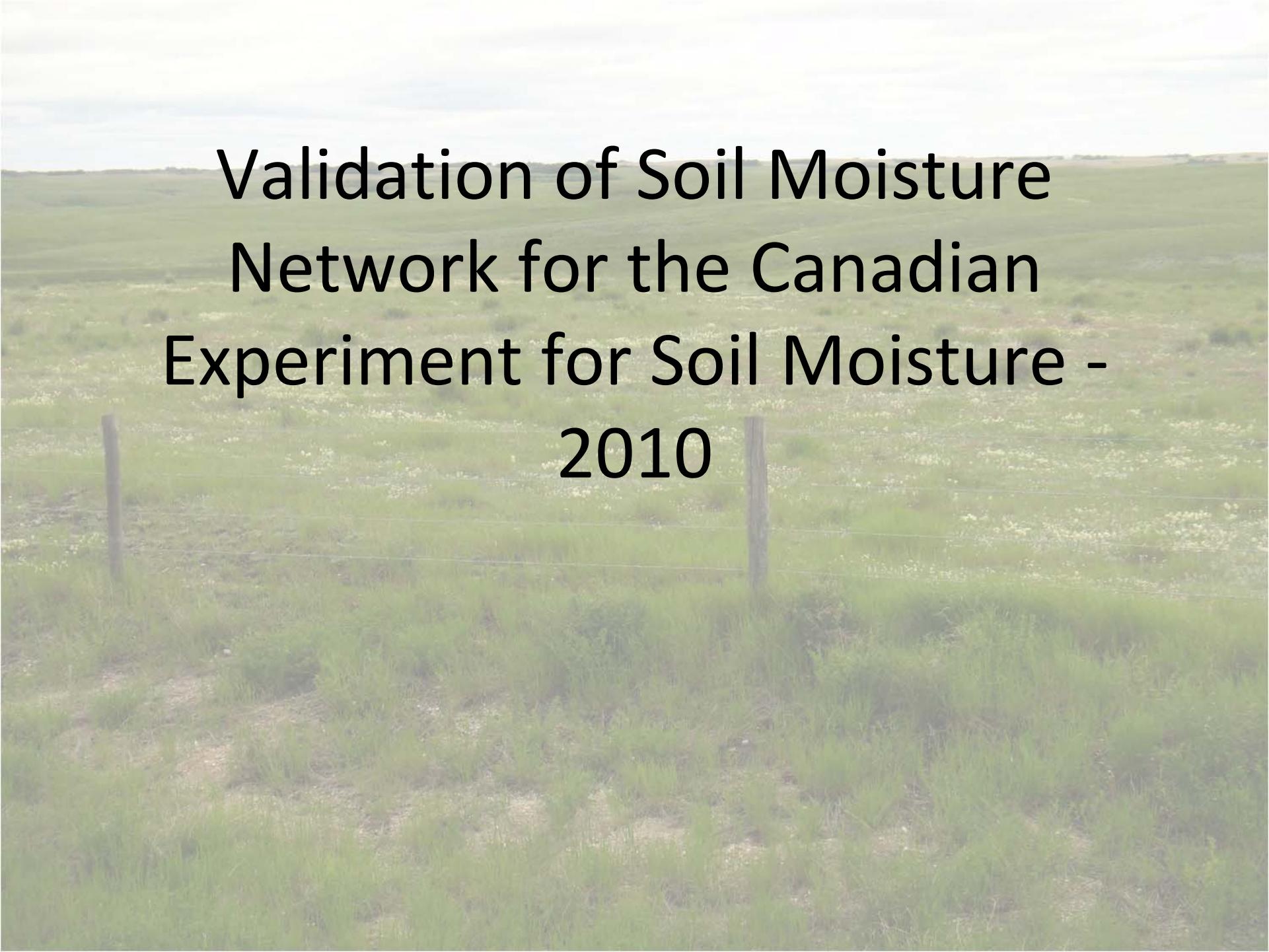


Soil Moisture and Variability Time Series

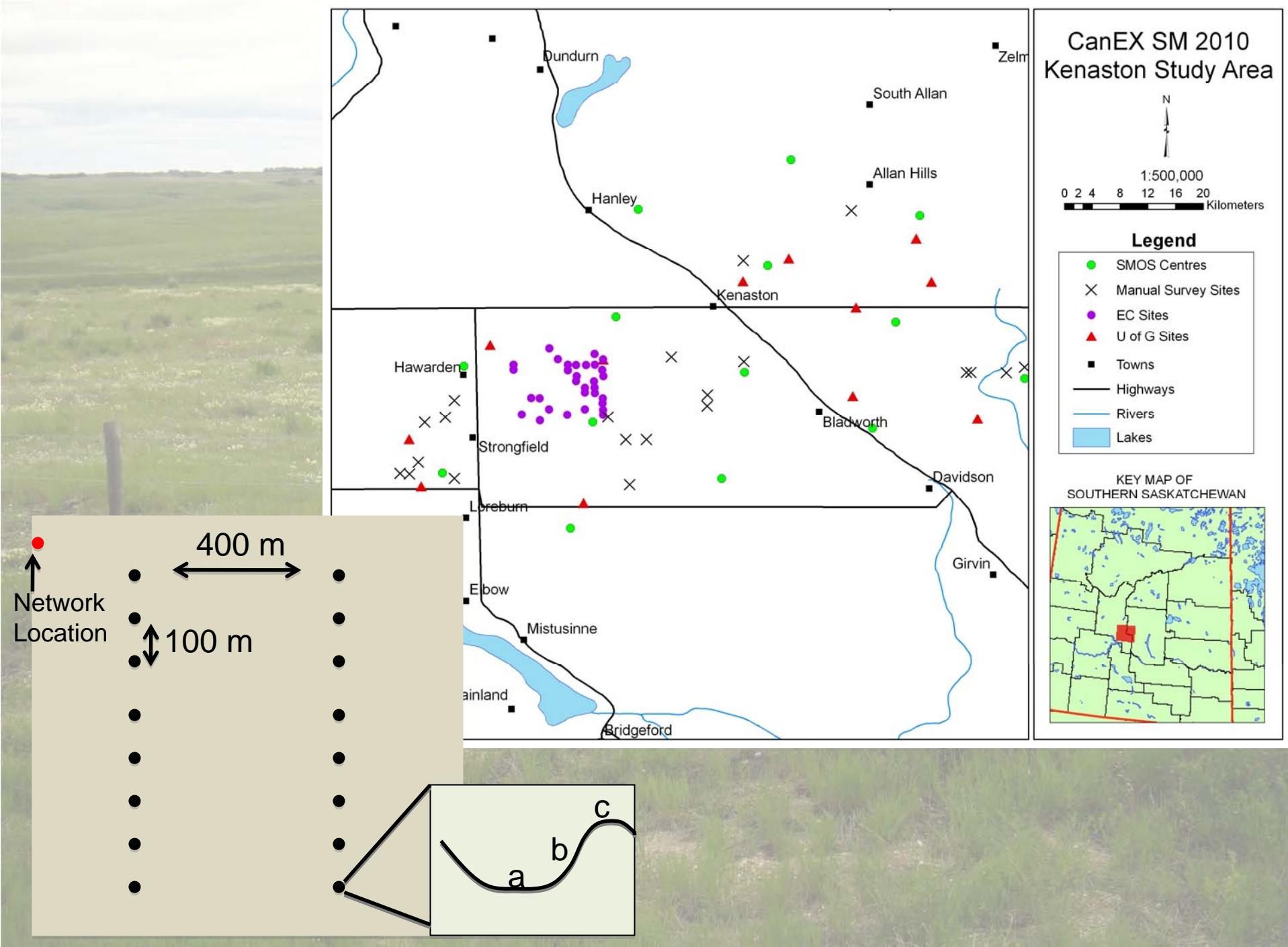


Network Time Series During CanEX-SM10

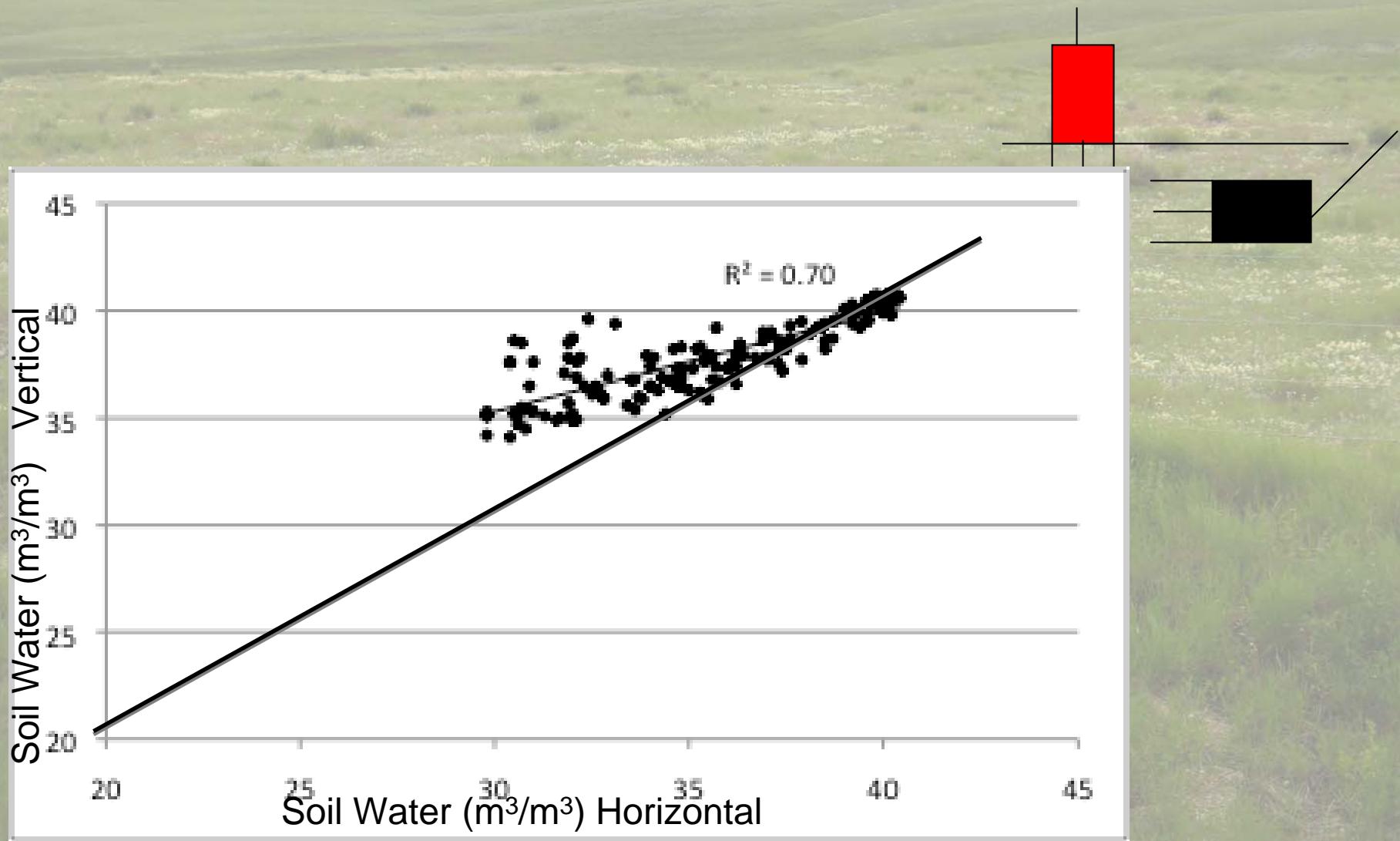


A photograph of a vast, green, grassy field under a cloudy sky. In the foreground, there is a simple wire fence made of wooden posts and horizontal wires. The text is overlaid on this image.

Validation of Soil Moisture Network for the Canadian Experiment for Soil Moisture - 2010

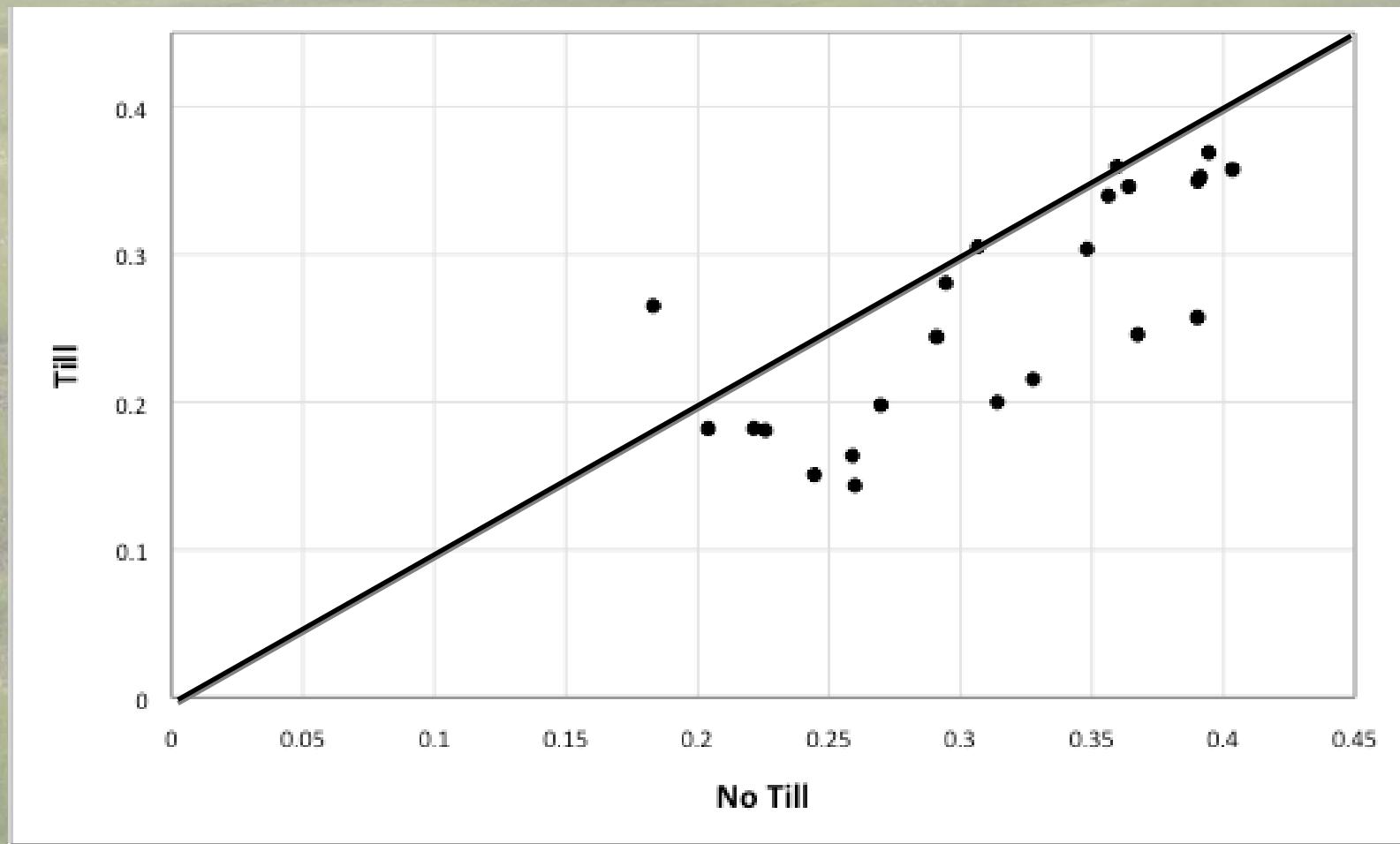


Impacts of Sensor Orientation?

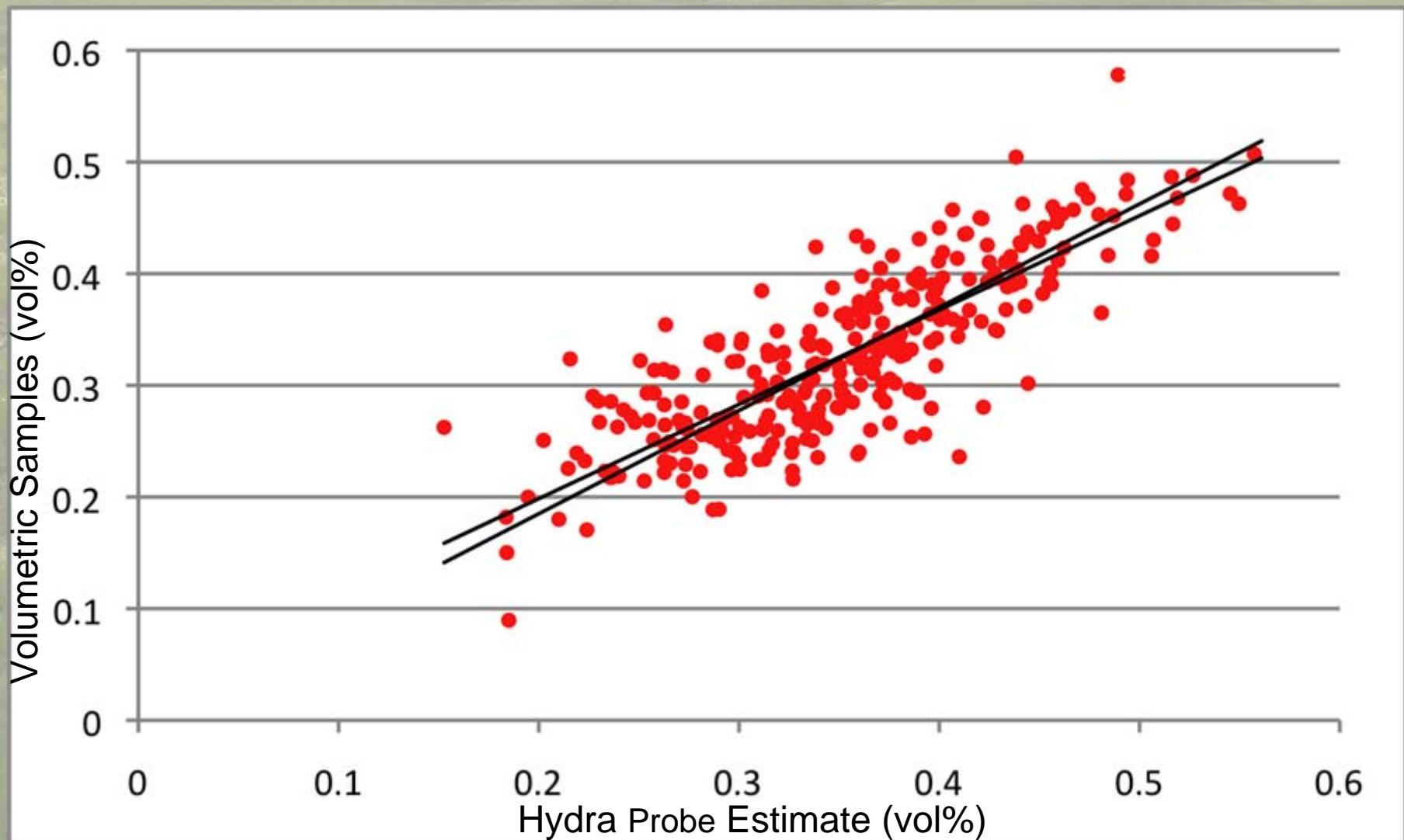


Impacts of Land-use Practices

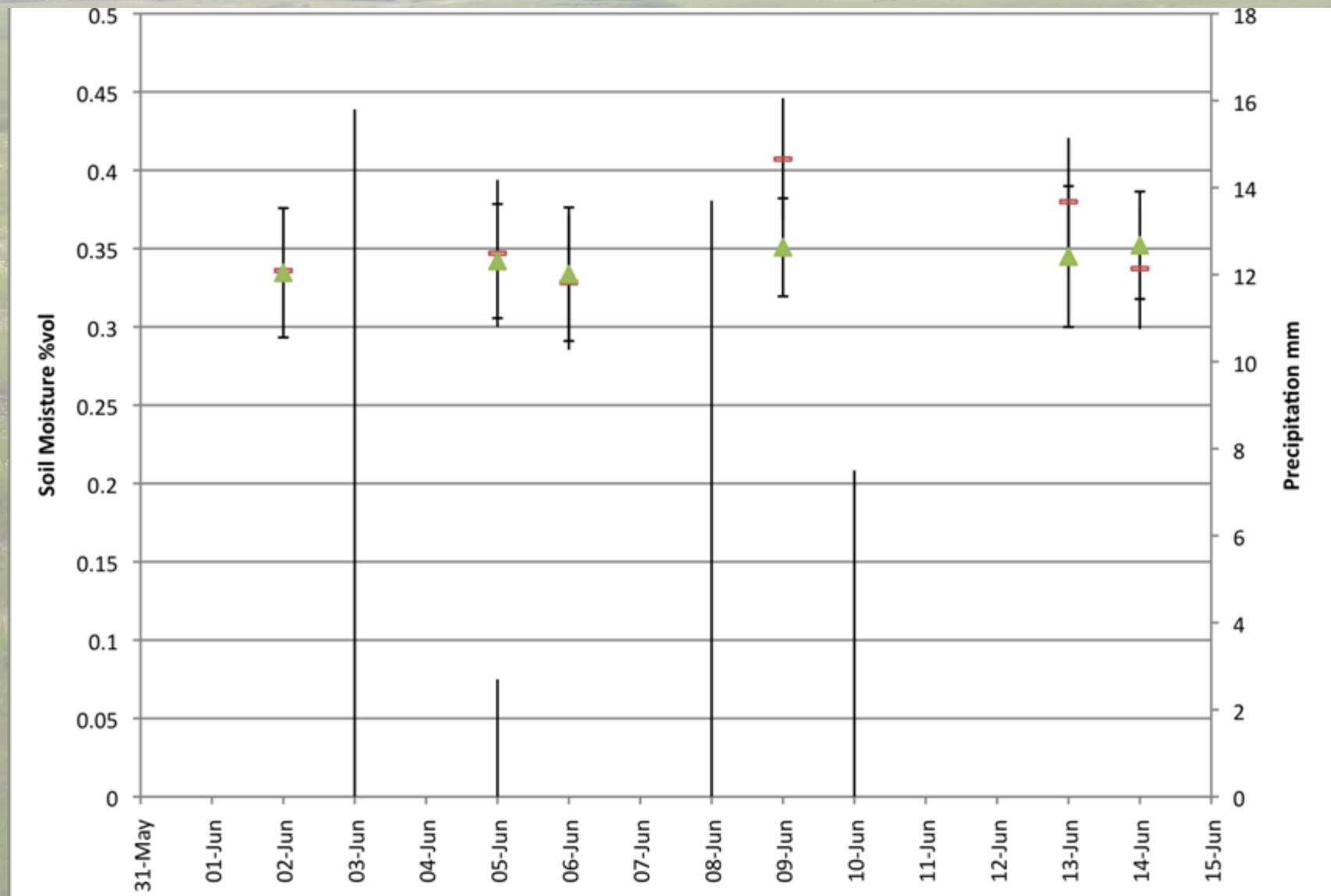
Tillage



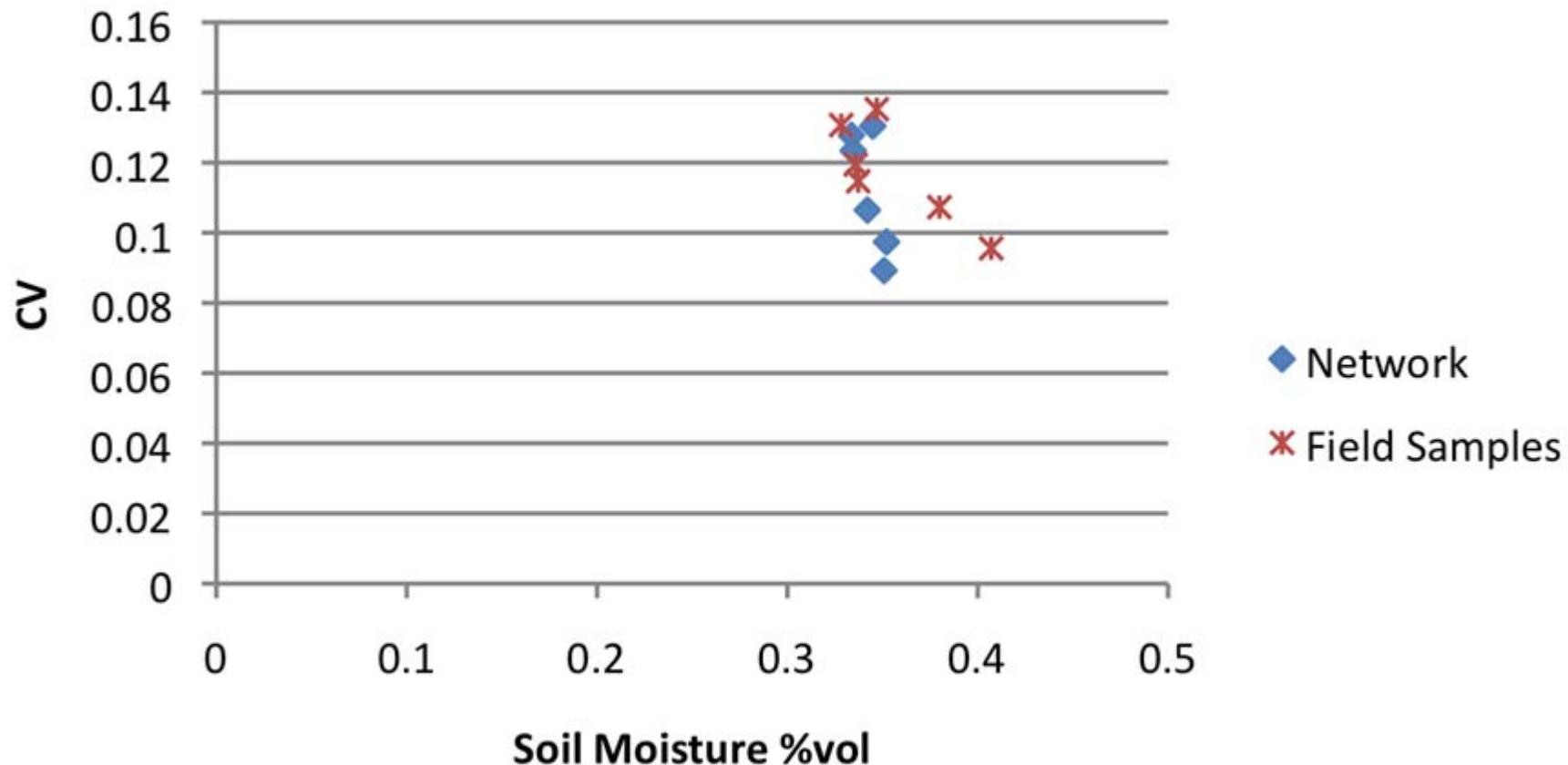
Calibration of Portable *in situ* Sensors



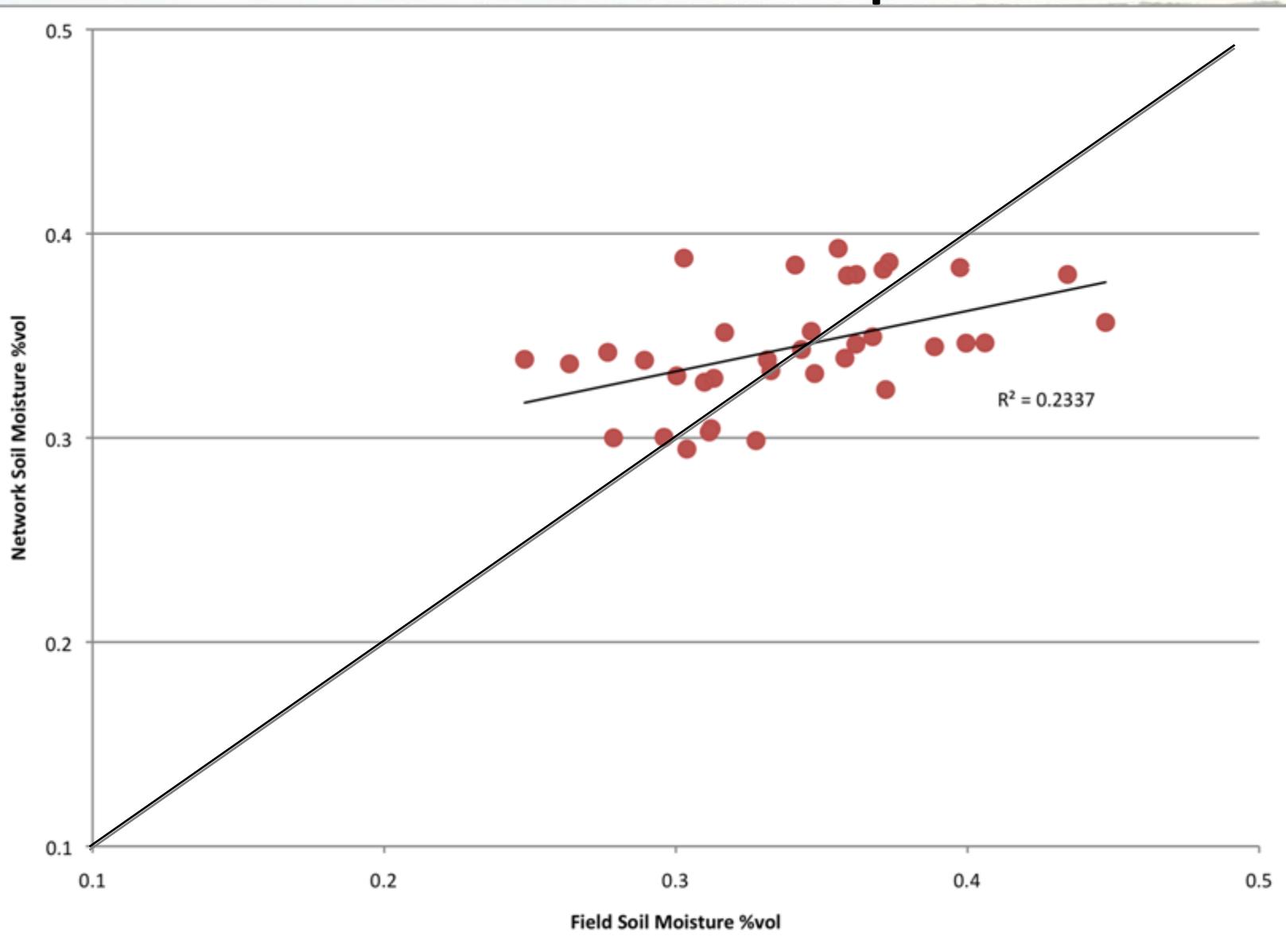
Network and *In Situ* Time Series



Network and *In Situ* Variability During CanEX-SM10

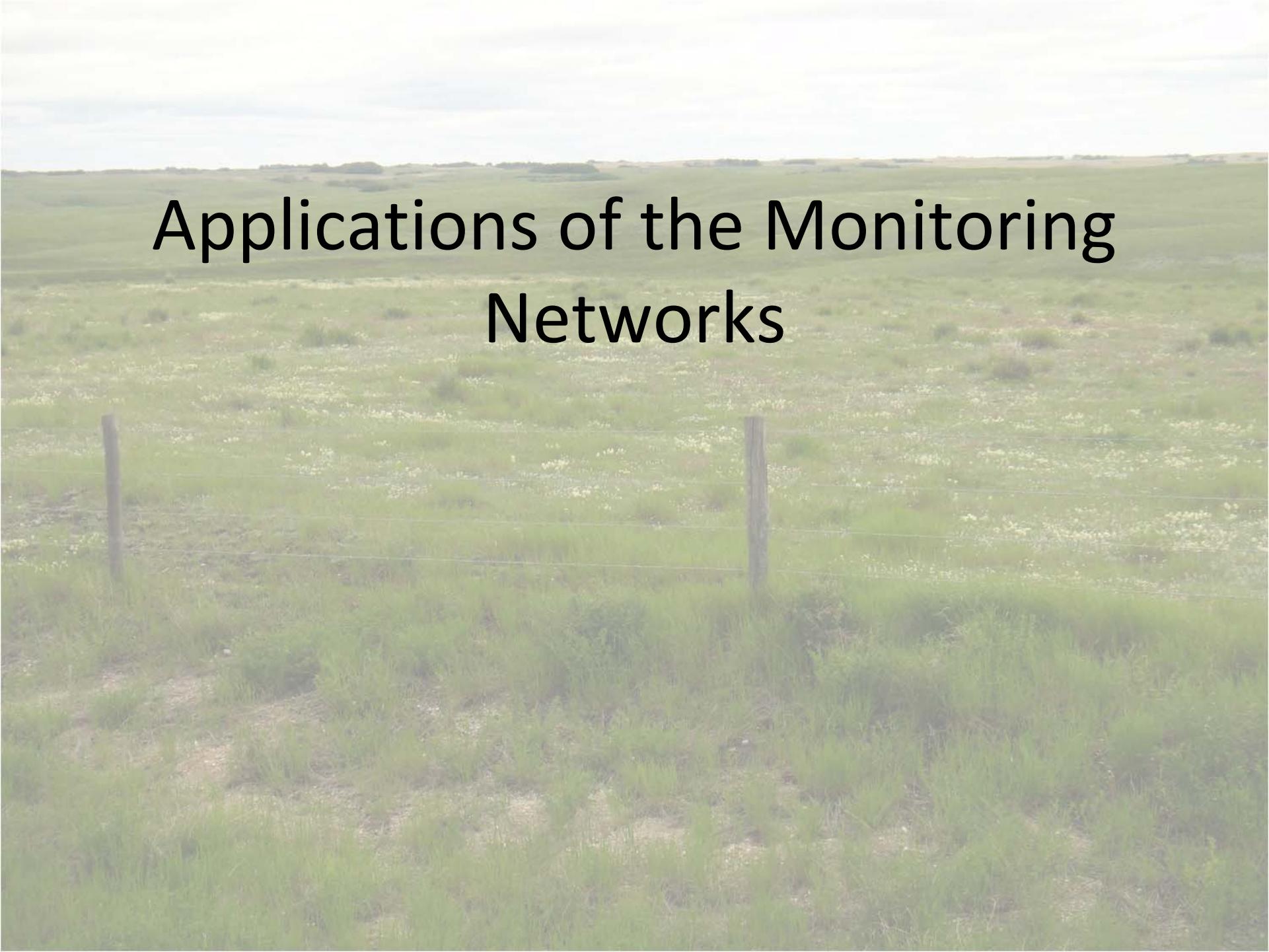


Network to Field Comparisons



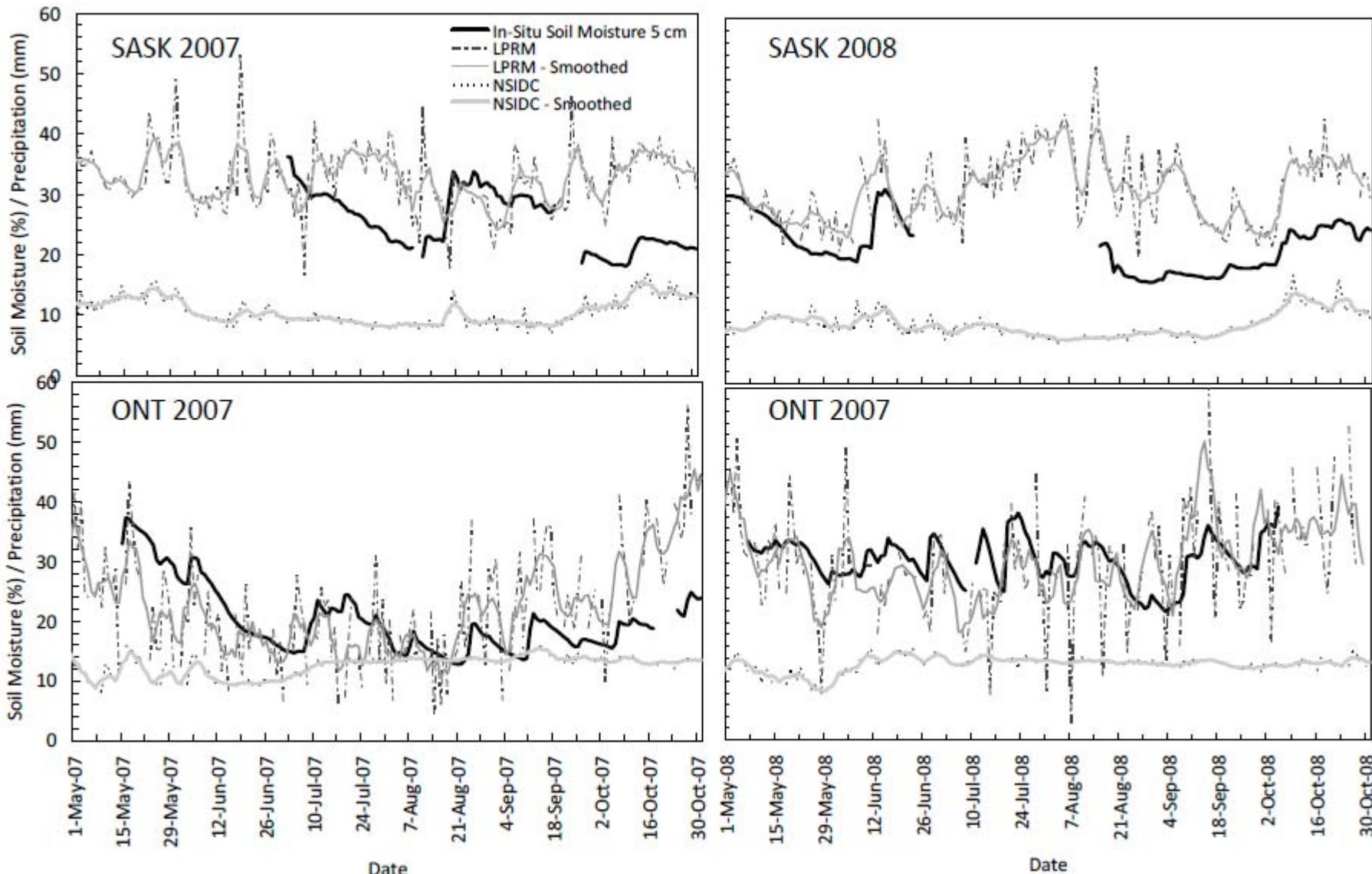
Networks as Validation Targets for Satellite Based Soil Moisture Estimates

- Raw network data will be most valuable for correlation analysis
- Questions of root mean square or bias require a calibrated network

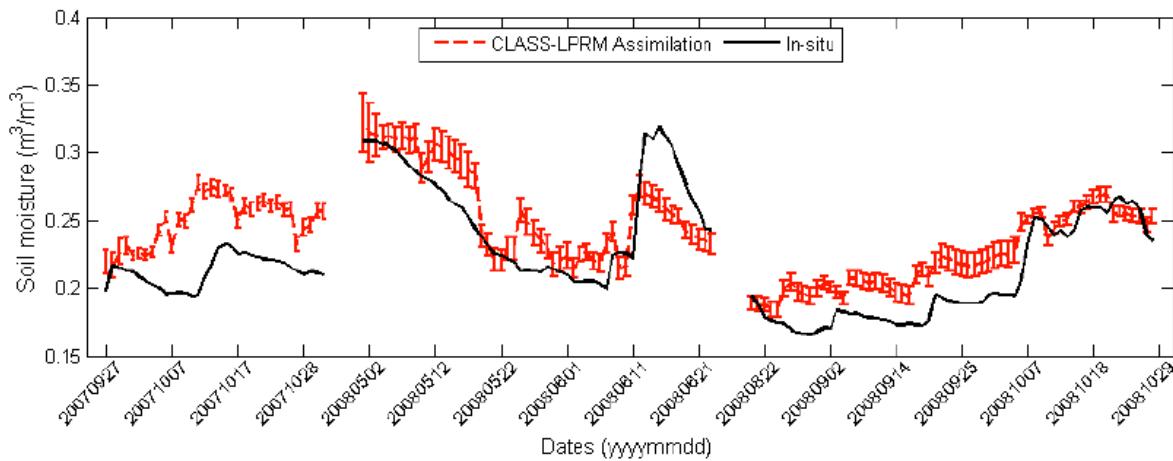
The background image shows a vast, green grassland under a pale, overcast sky. In the foreground, a simple wire fence with wooden posts runs across the frame. The text is overlaid on the upper portion of the image.

Applications of the Monitoring Networks

Validation of Soil Moisture Retrieval Algorithms



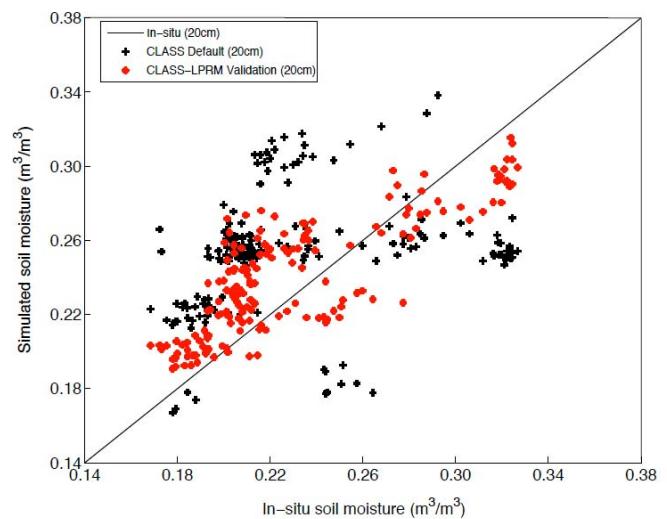
Validation Data Assimilation Schemes into Land Surface Models (CLASS)



Soil Moisture Time Series and CLASS ensemble soil moisture estimates (after assimilation)

Validation of assimilation in CLASS.
CLASS soil moisture estimates at 20cm
(open-loop – black,
assimilation in red)

(Dumedah et al. Submitted)



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