Soil Moisture Modeling and Monitoring
An Agricultural Perspective

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Value of Soil Moisture Data in Ag

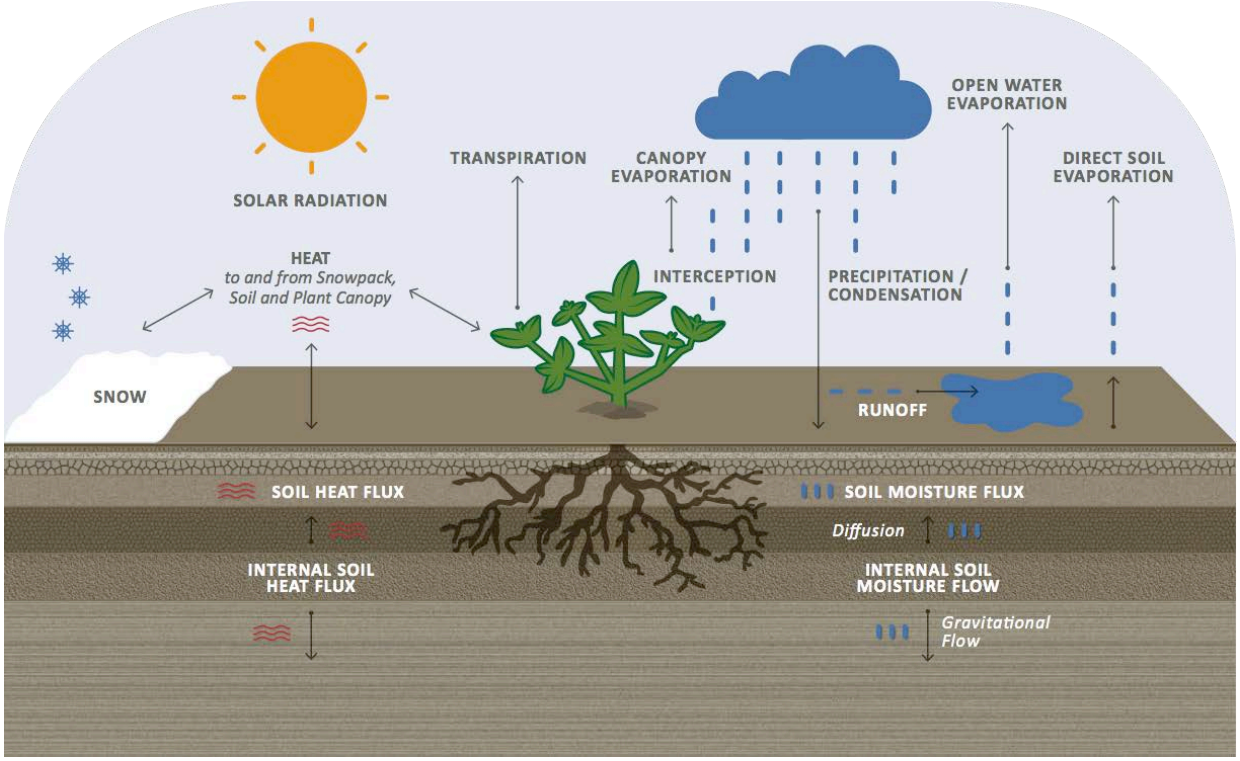
- Irrigation decisions
- Nutrient placement/losses
- Seed selection
- Efficacy of applied materials

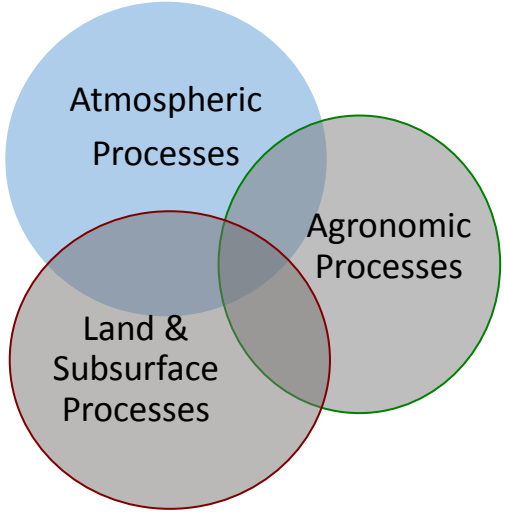
How Does a Grower Know?

- “Podimetric pedon probing”

  Kick the dirt!
- Ribbon test
- Budget method
- Sensors

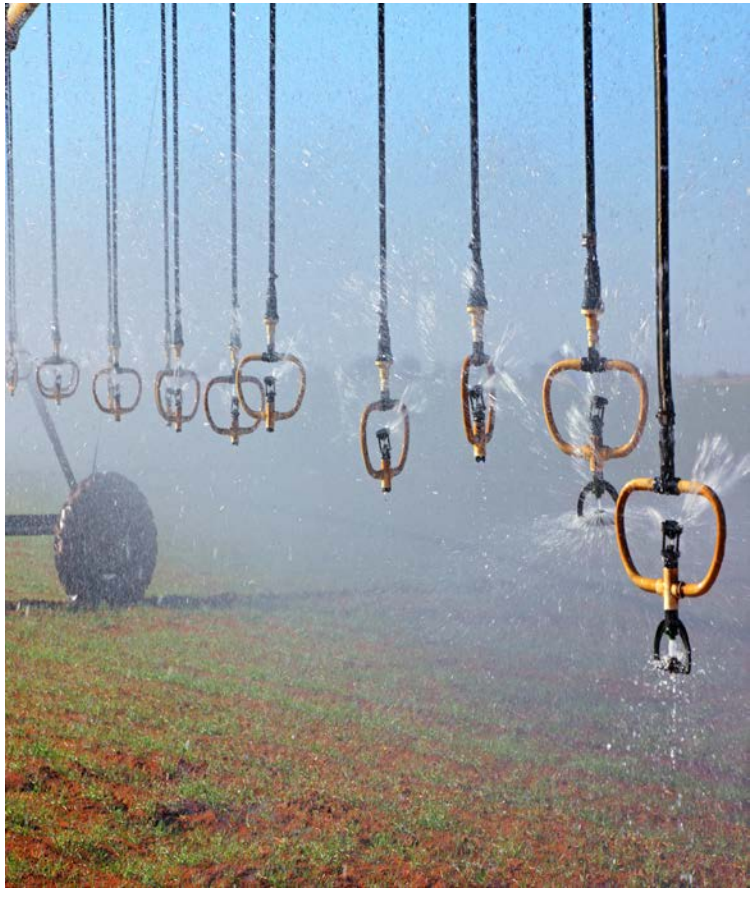
Land Surface Modeling (Noah)



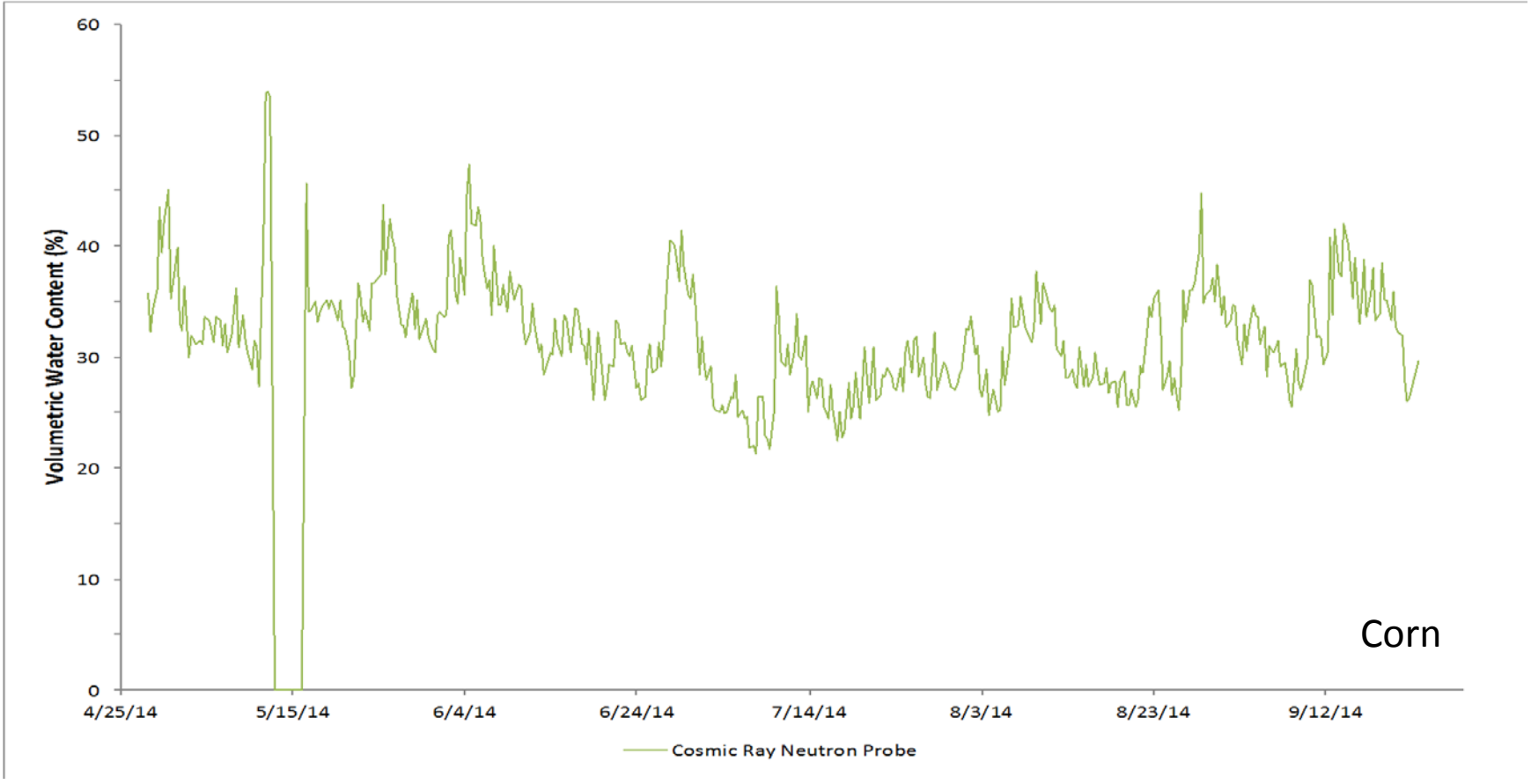


Does it Work?

- Need high-quality, representative soil moisture measurements for validation
- Agriculturally relevant vegetation
- Different soil types
- Varying climates

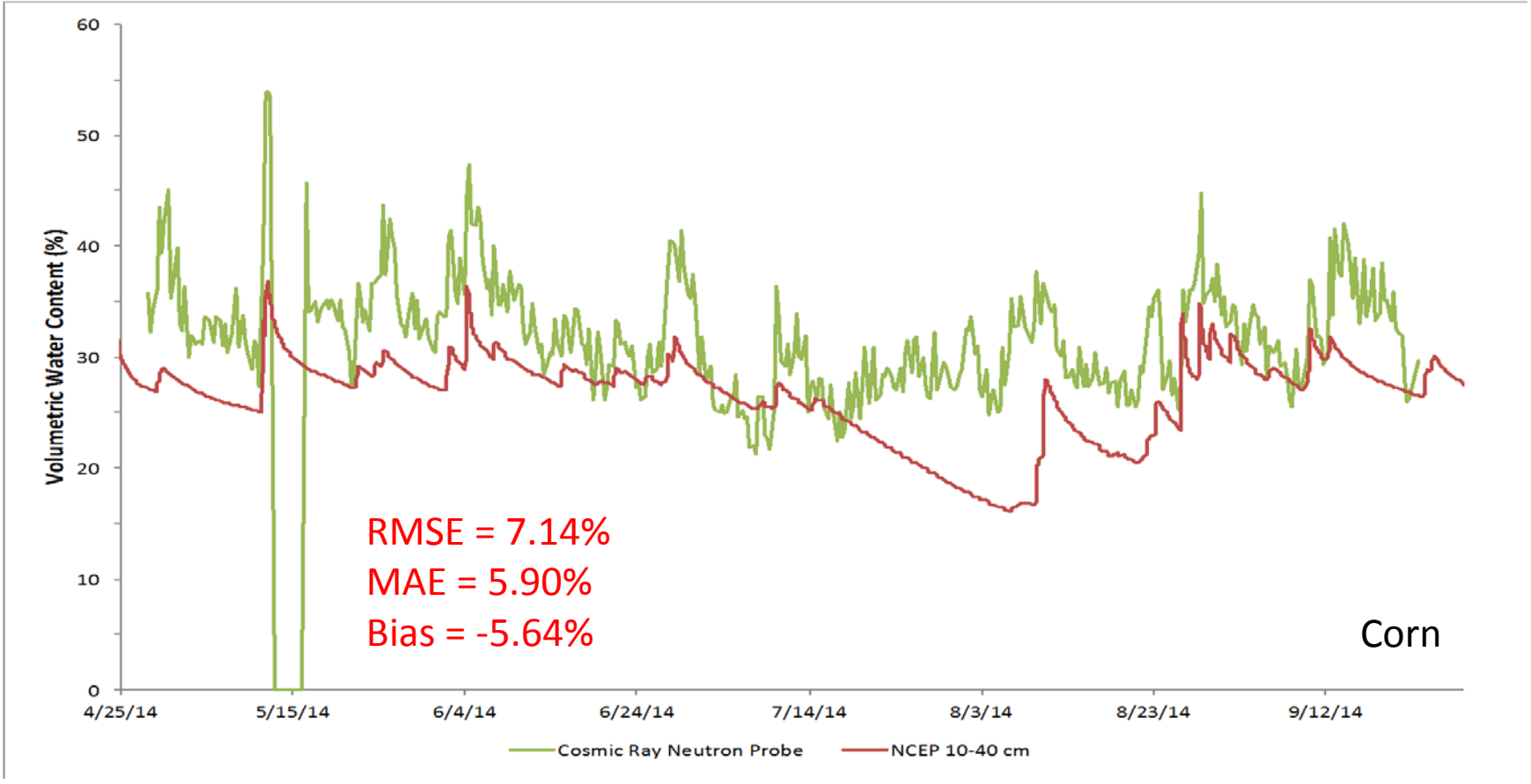


CRNP Validation Data

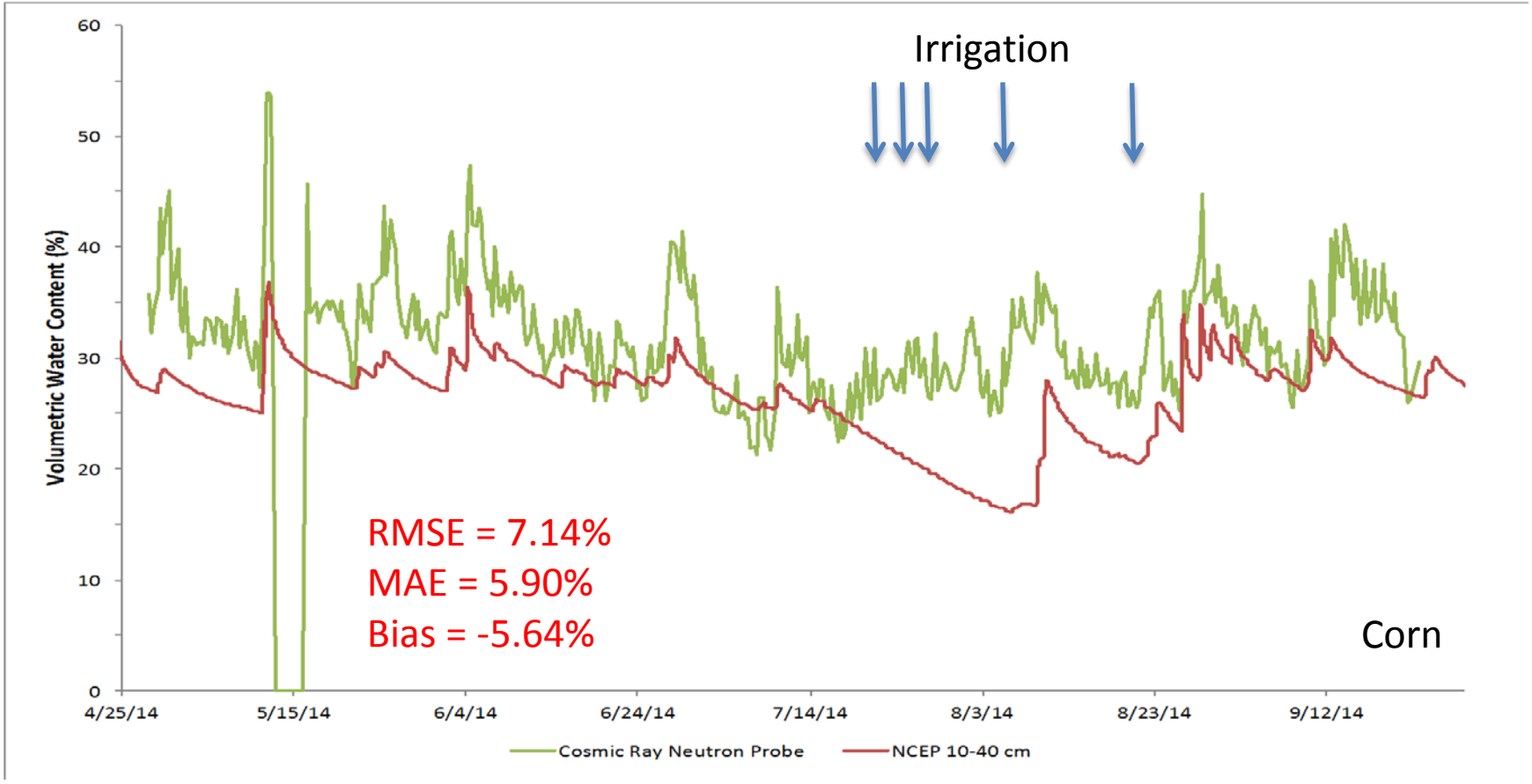


Franz et al., 2015

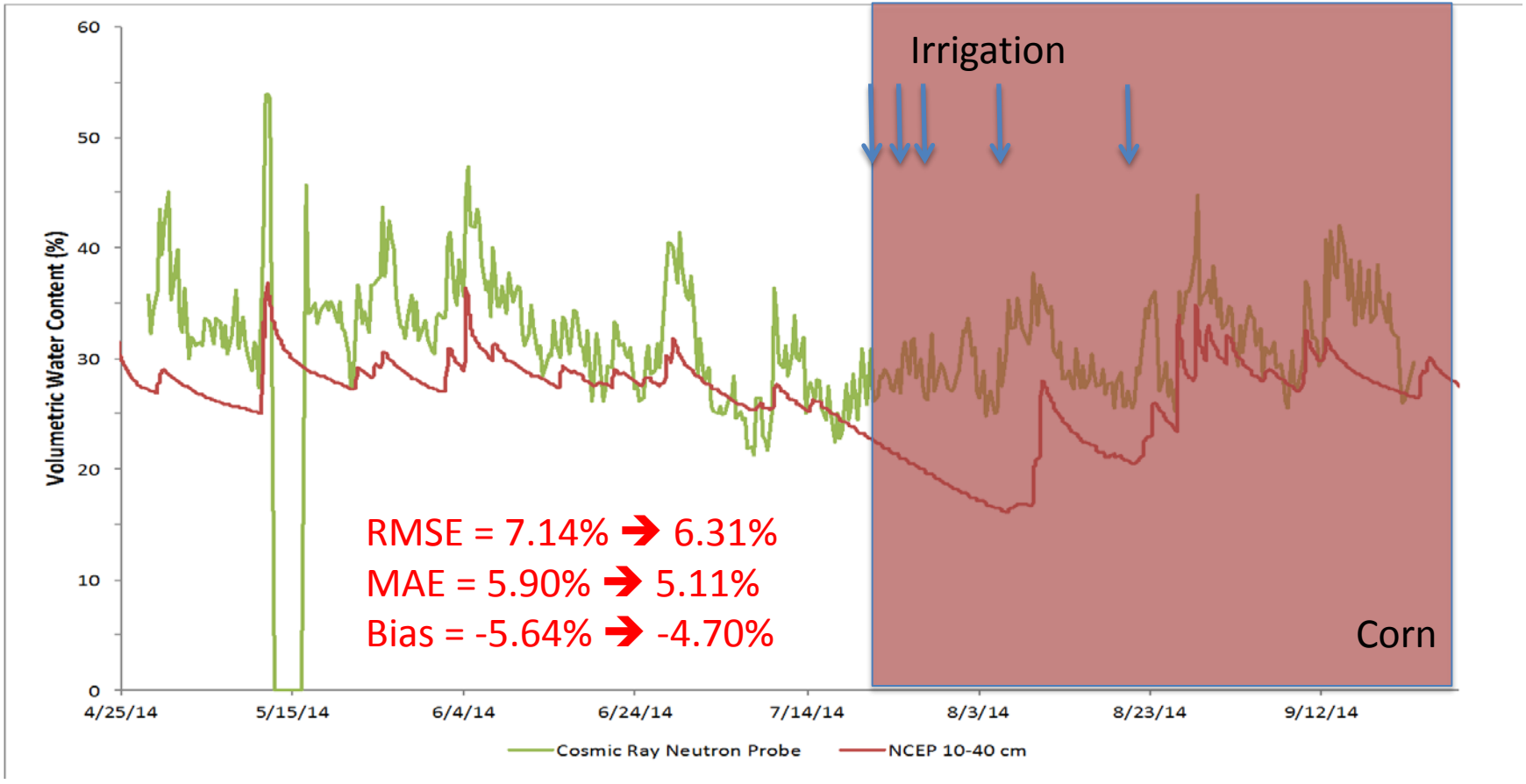
NCEP-Noah LSM



NCEP-Noah LSM



NCEP-Noah LSM

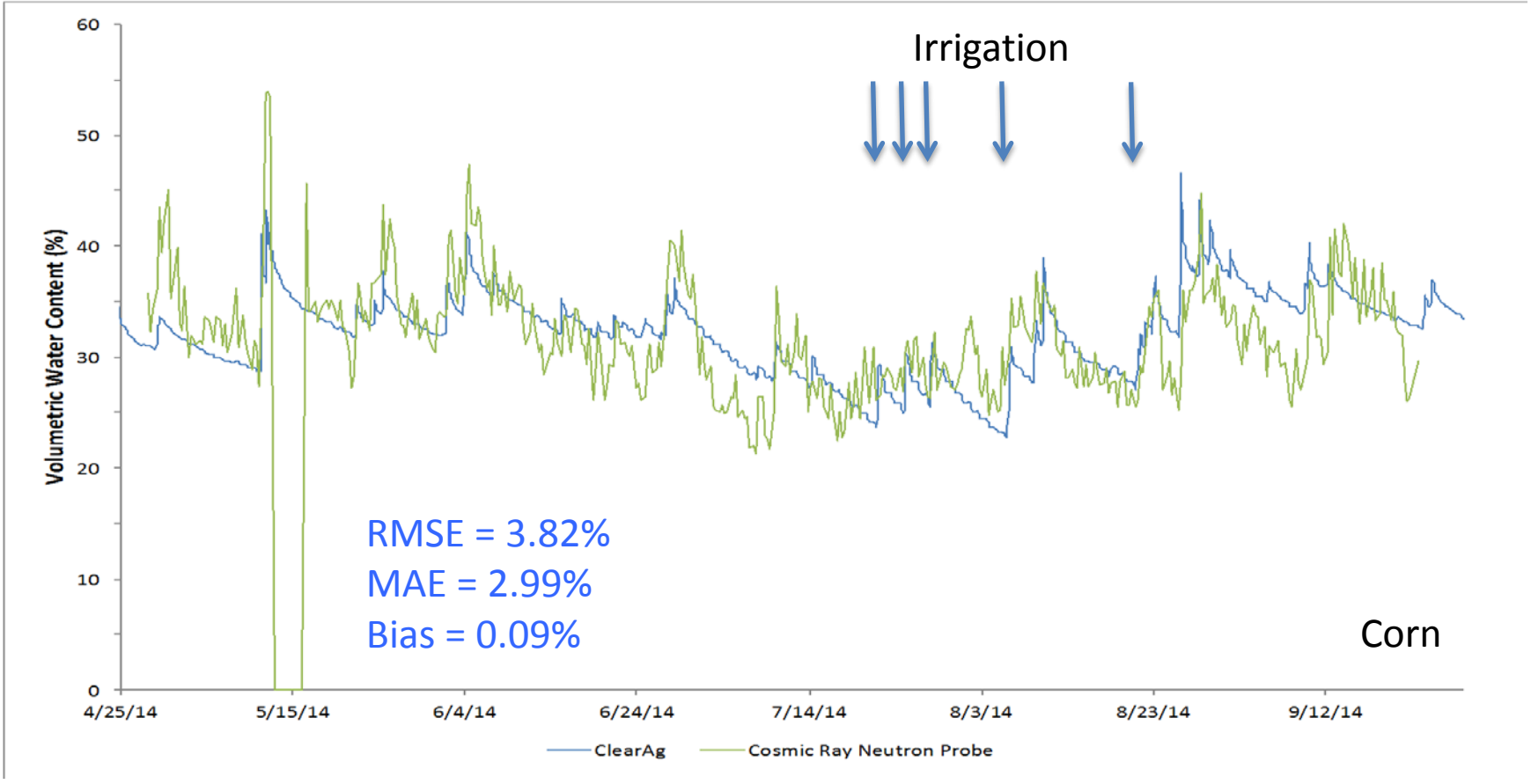


Customized Land Surface Modeling

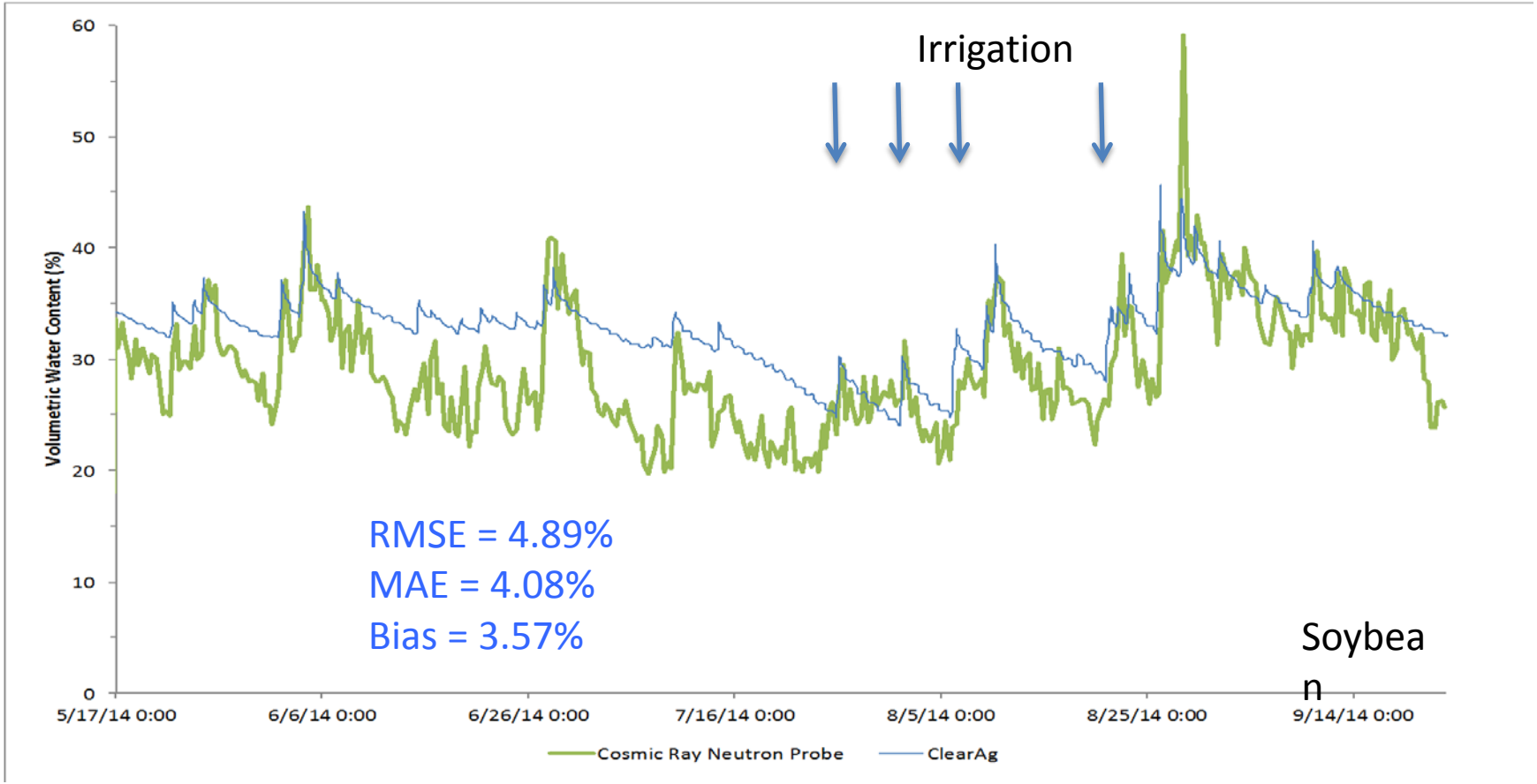
Land Surface Model

Soil Moisture, Soil Temperature, Canopy Wetness

Customized Land Surface Modeling



Customized Land Surface Modeling



Summary

- Soil moisture critical to agriculture for a variety of reasons
- Land surface modeling incorporating field-specific parameters can provide good results
- Need high-quality, spatially representative measurements for validation and to aid model improvements

Questions/Comments?

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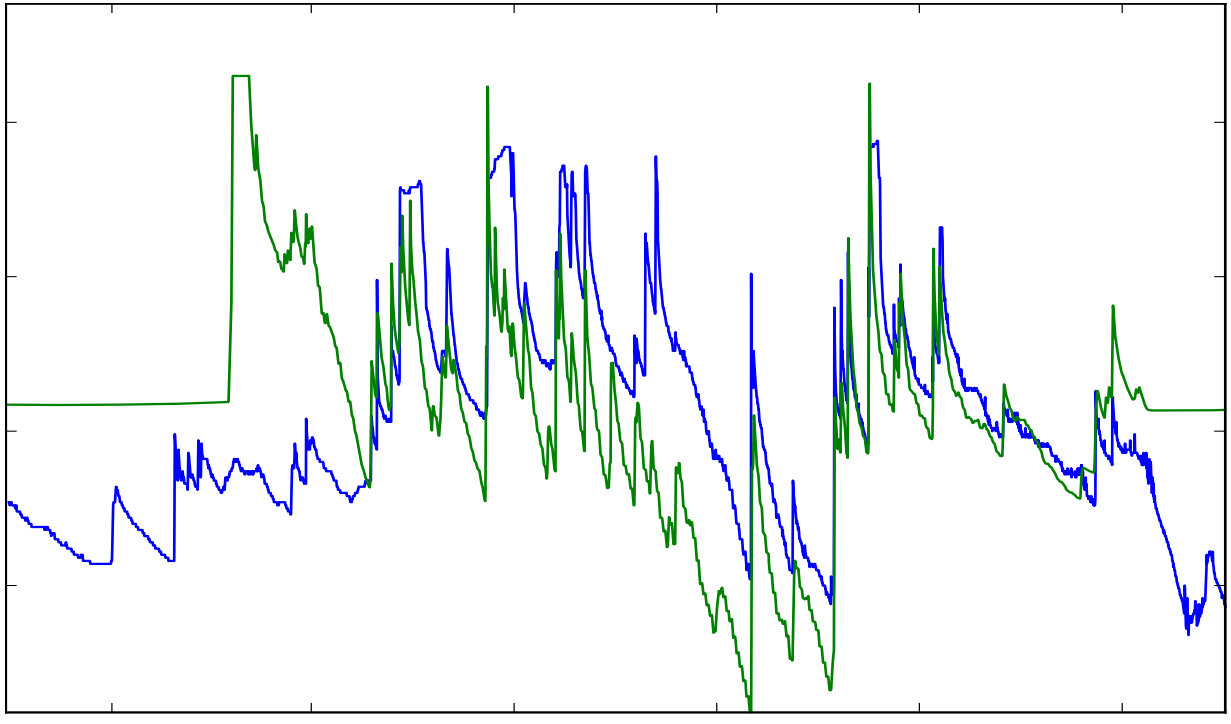
TDR Sensors – ISU Soil Moisture Network



Ocheyedan Site

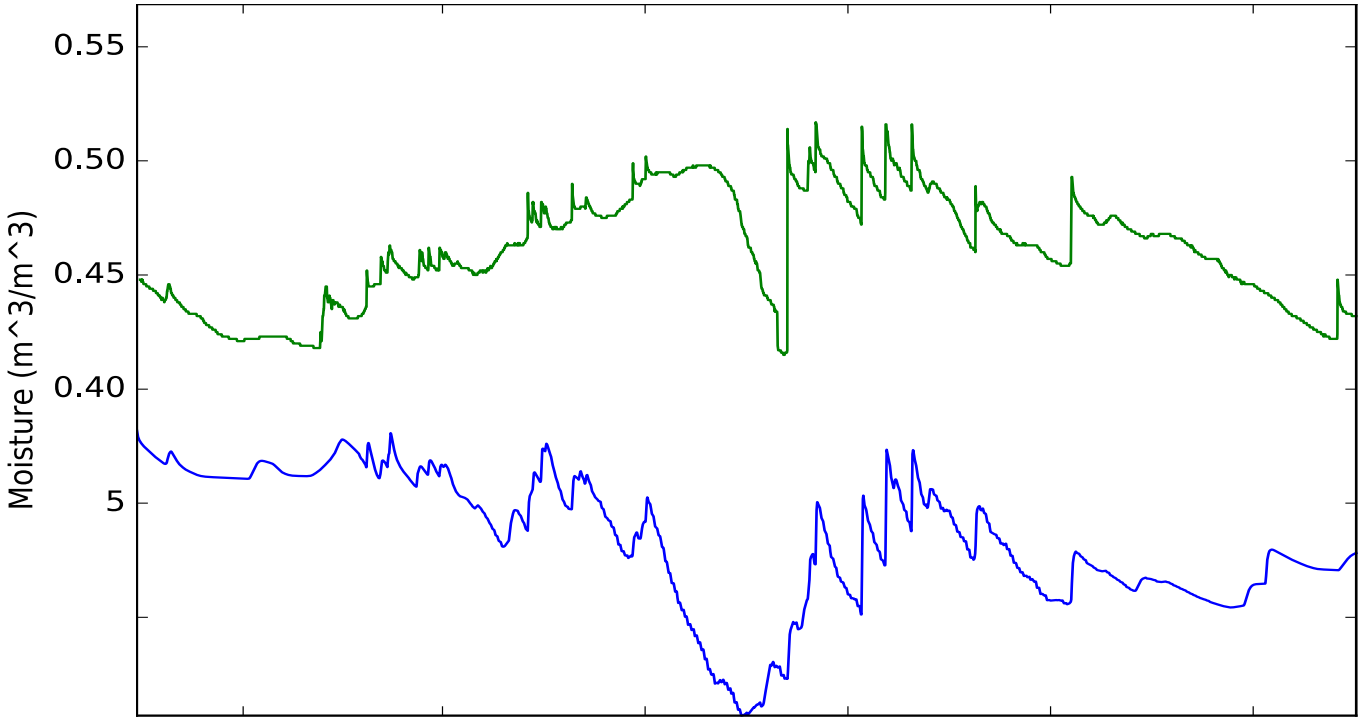
Measured

Modeled

RMSE = 4.1%

Bias = 0.5%

TDR Sensors – ISU Soil Moisture Network



Crawfordsville Site

Measured

Modeled

RMSE = 13.4%

Bias = -12.7%