A scaling methodology to compare LST derived from VIIRS and measured by NOAA's observational networks

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AMS meeting 2012 – New Orleans, January 22-26, 2012

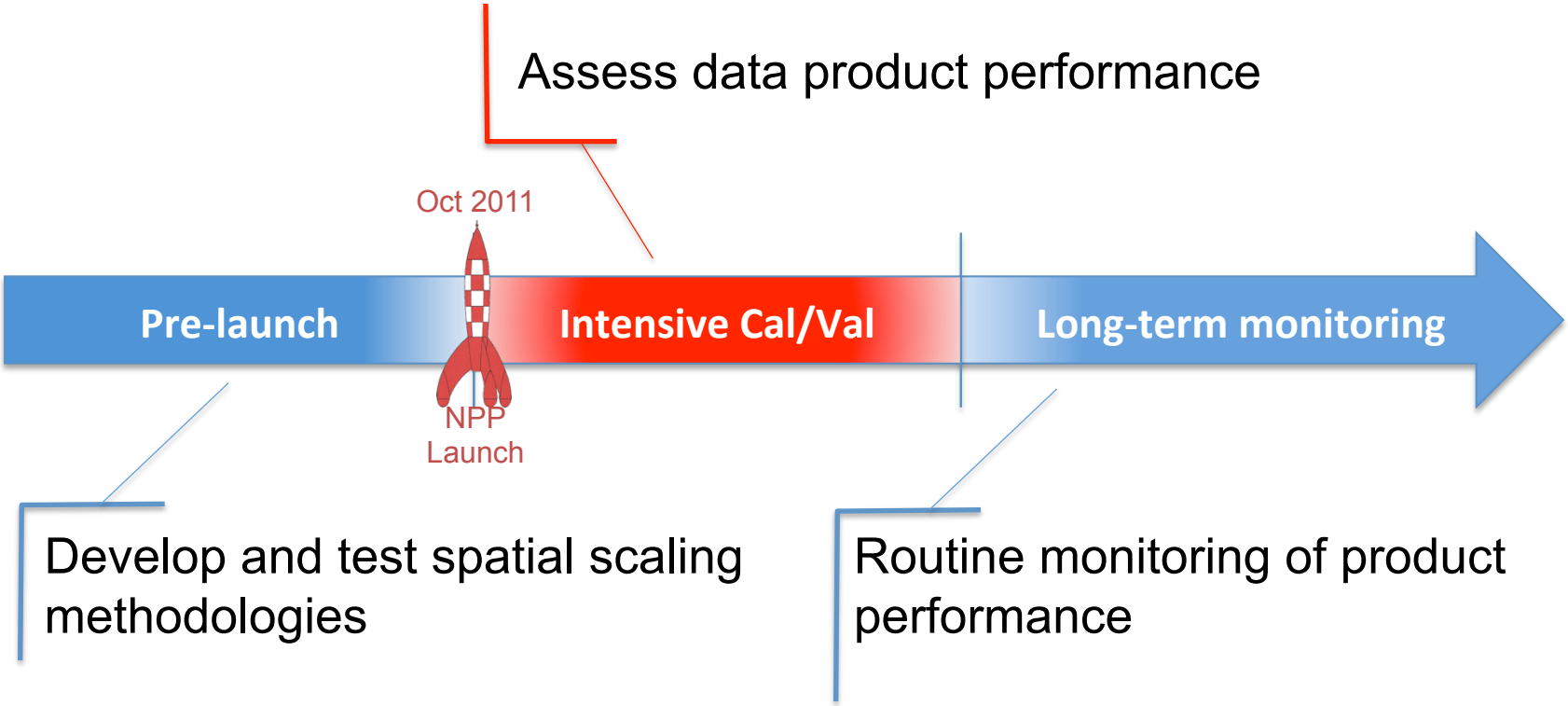
Context & Goal

Validation of VIIRS LST products

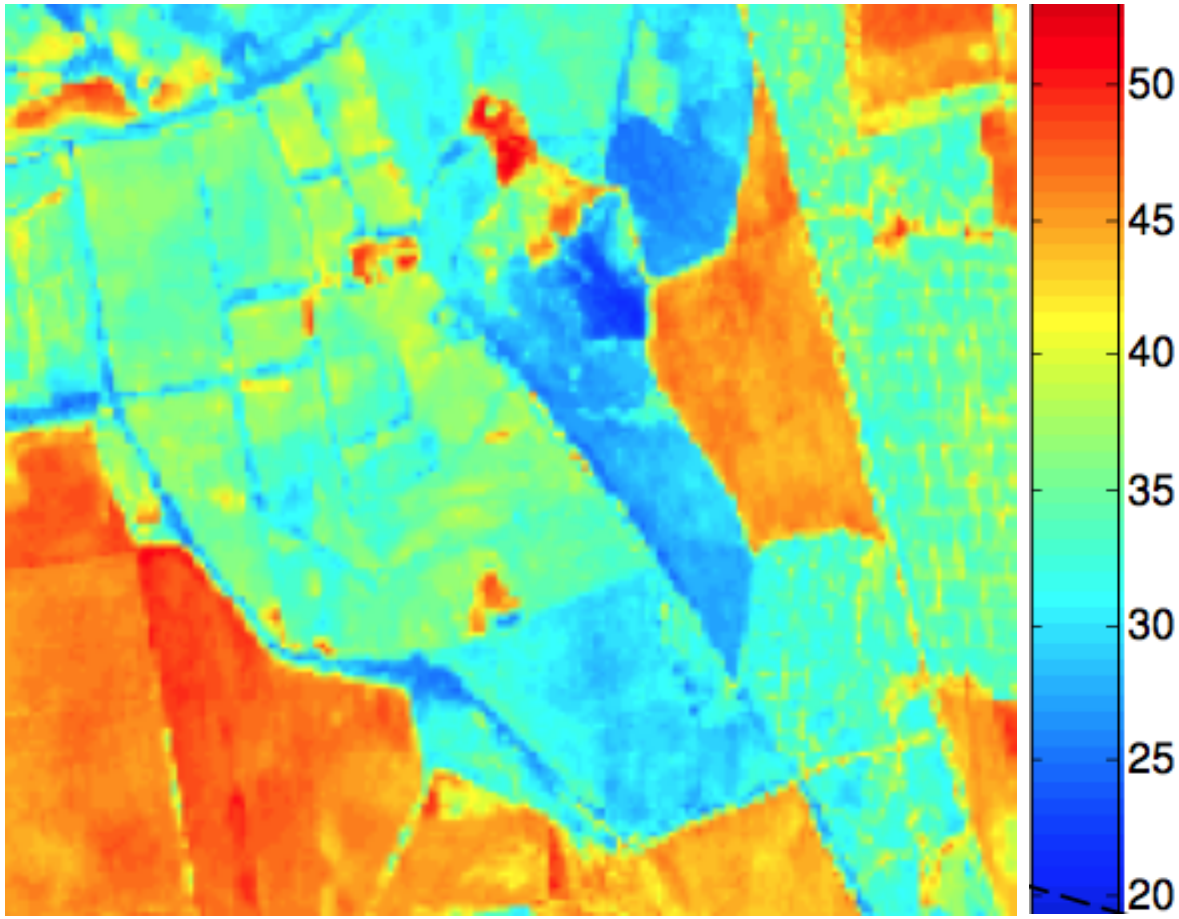
Fully evaluate the LST algorithm and quantify the accuracy and precision of the product - using:

- Comparison with heritage data: Aqua/MODIS
- Comparison with ground-based reference

Calibration/Validation phases

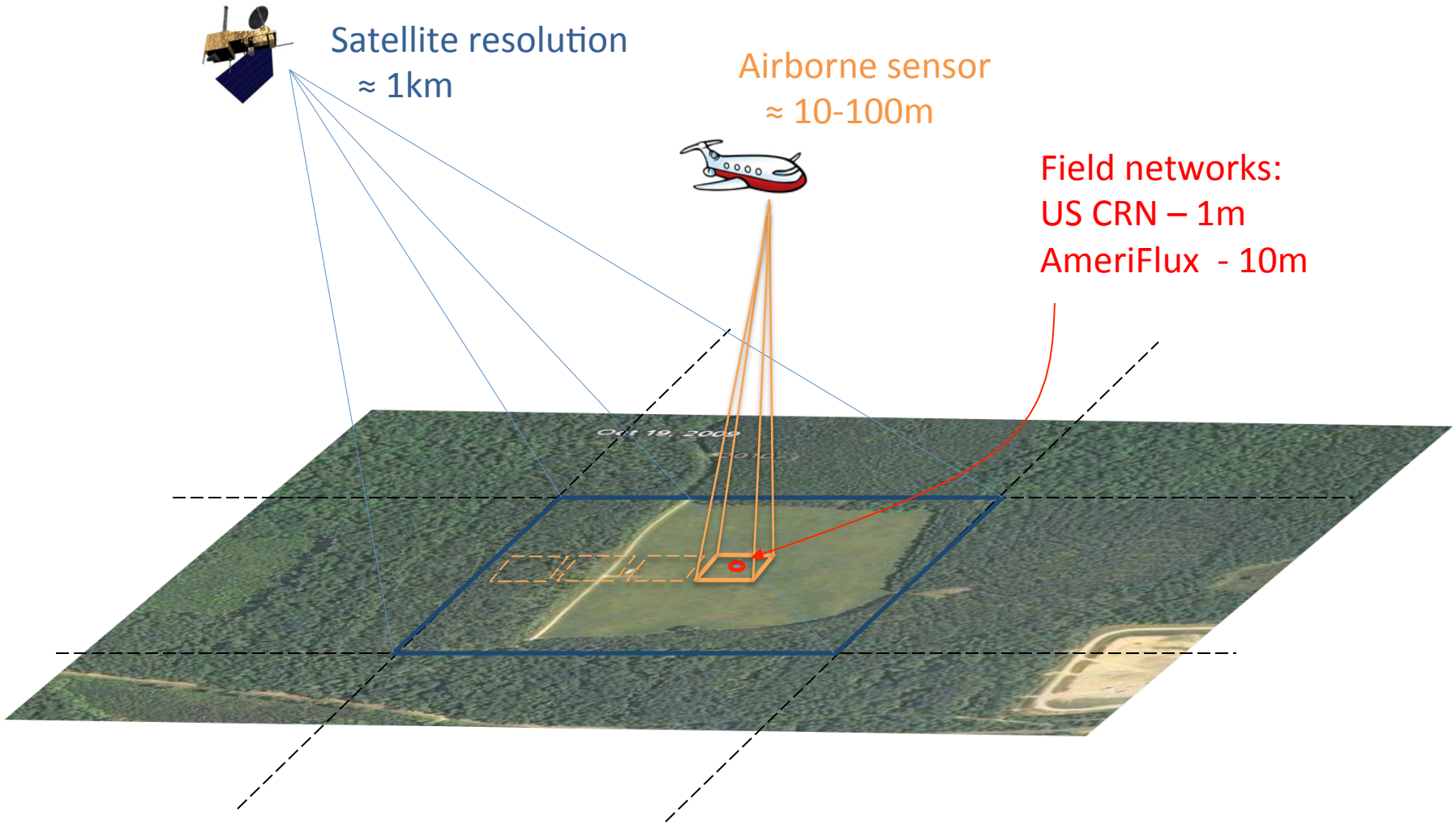


LST Spatial variability



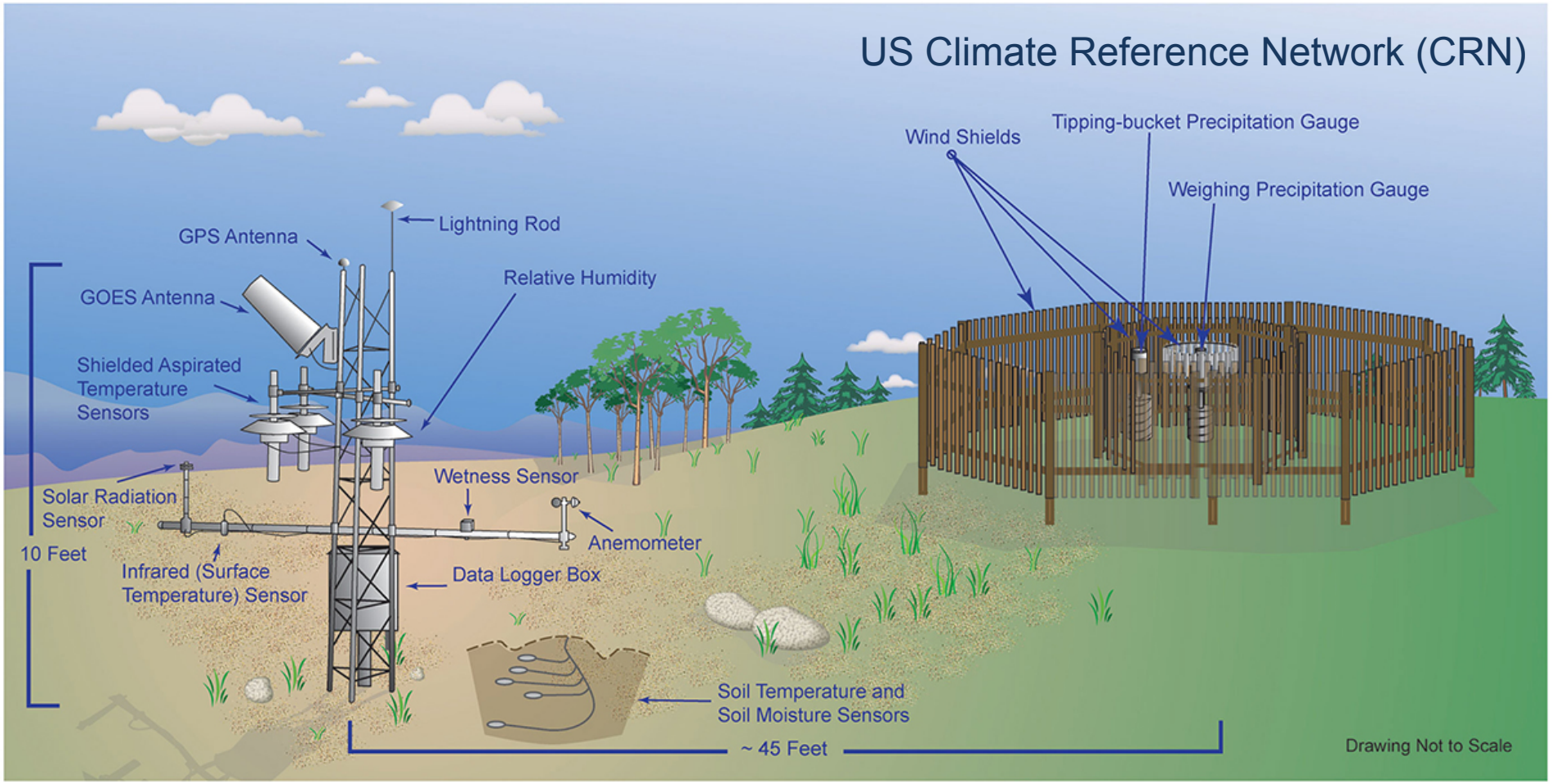
D. Courault, INRA, France

Challenge: scaling problem



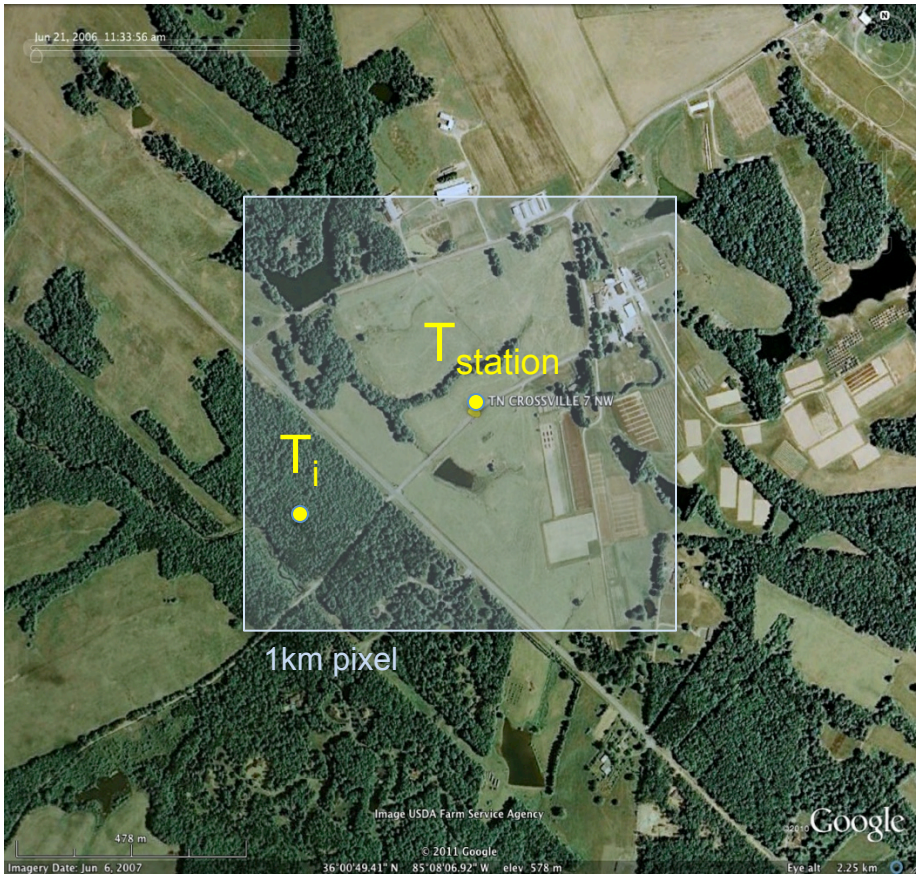
How to use ground observations to evaluate satellite product?

Field experiment = “Ground truth”



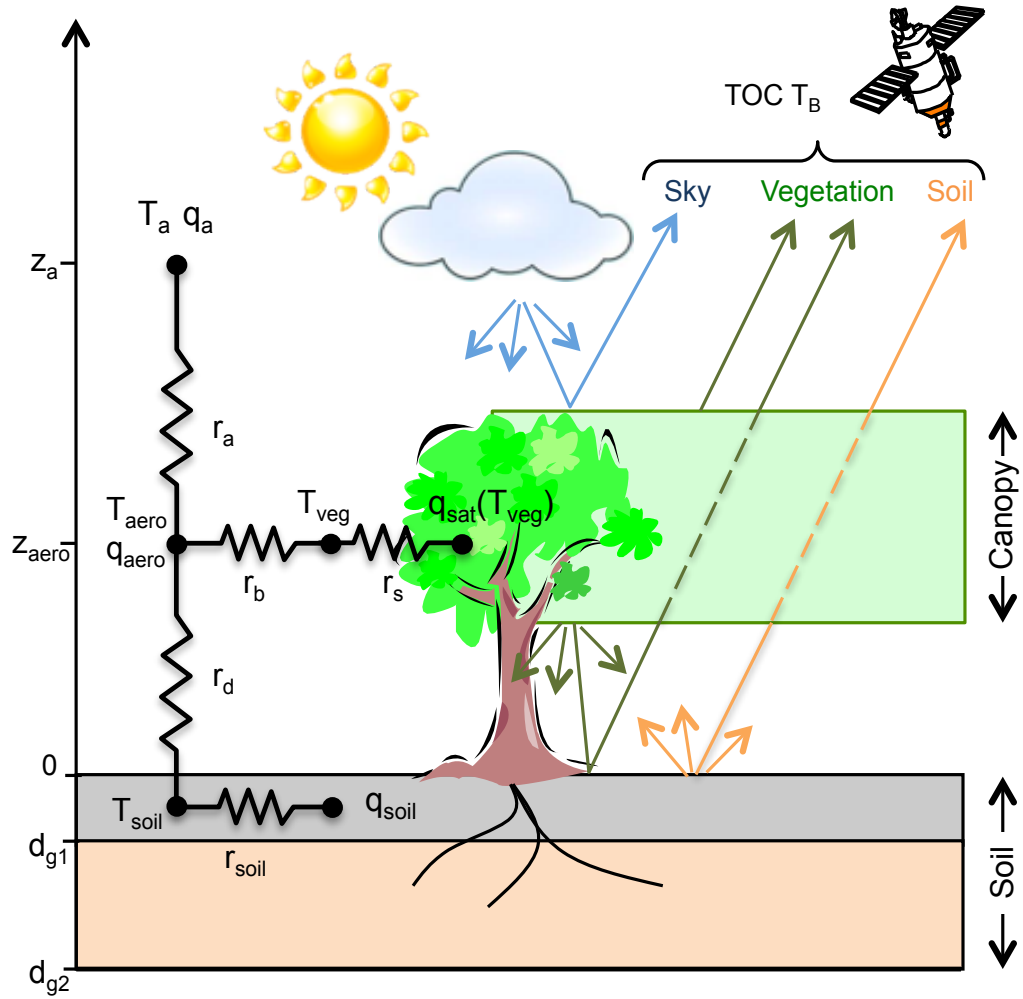
Spatial variability – Upscaling methodology

US Climate Reference Network (CRN)

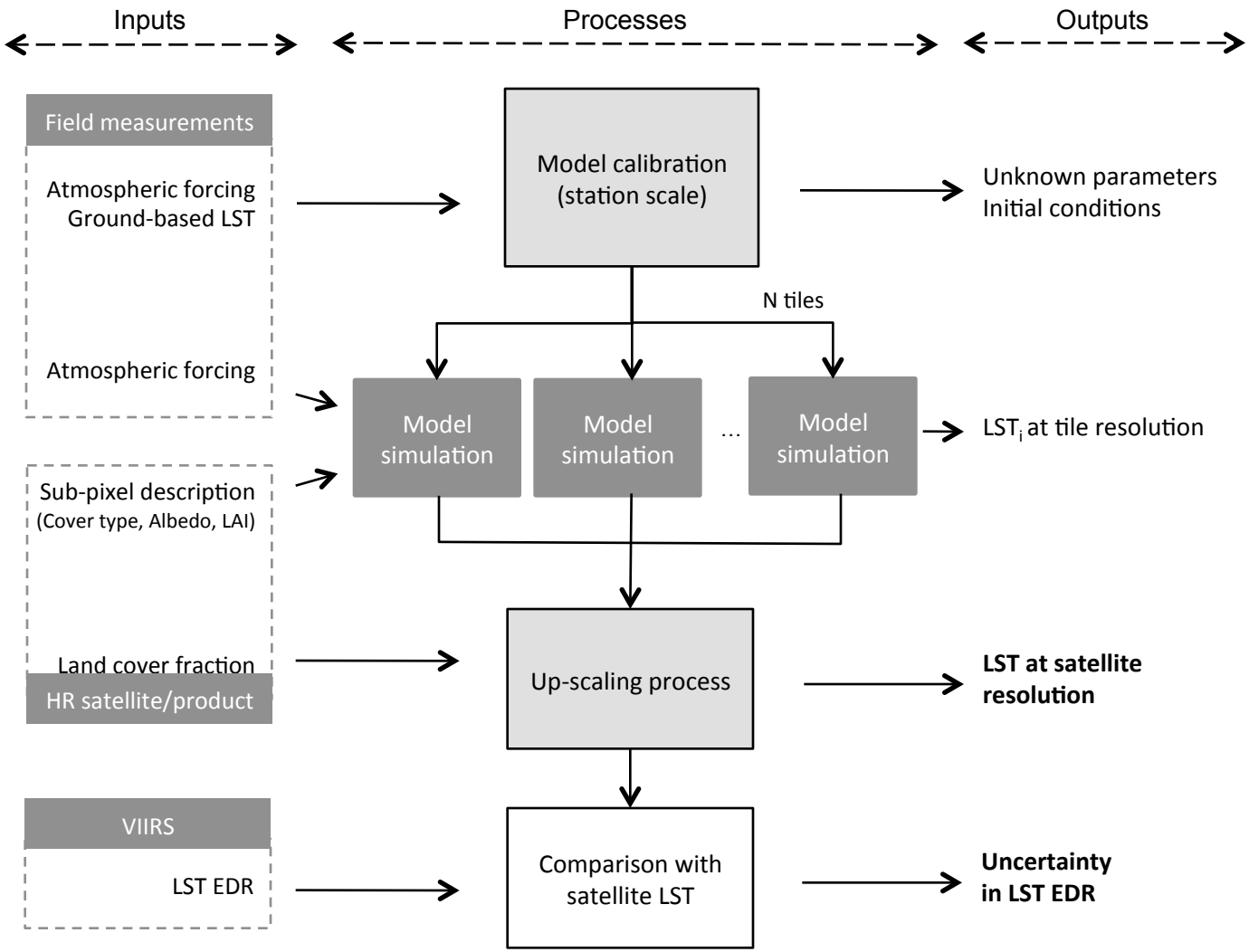


$$T_i = T_{station} + \Delta T_i$$

SETHYS Land Surface Model

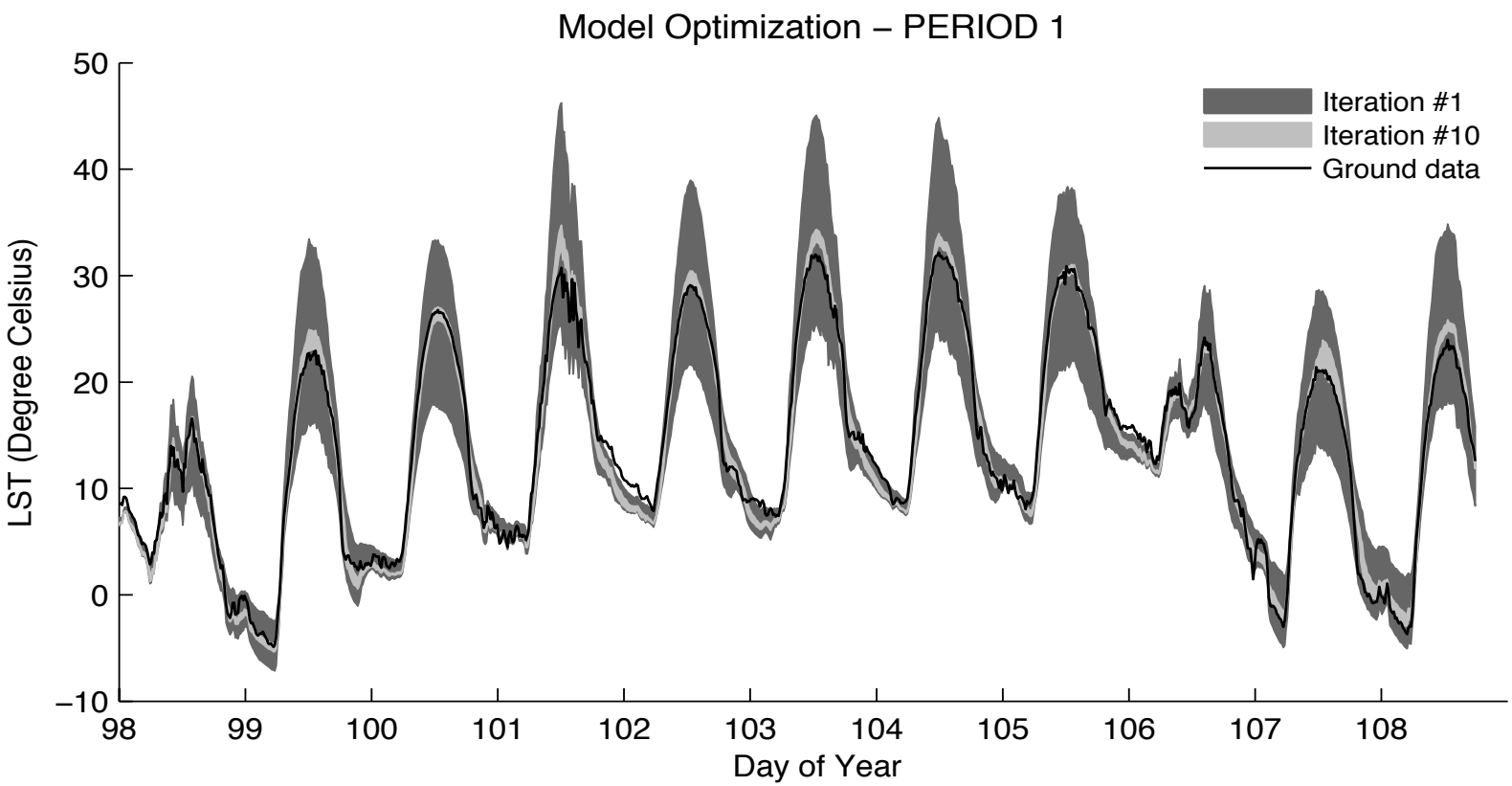


Scaling methodology

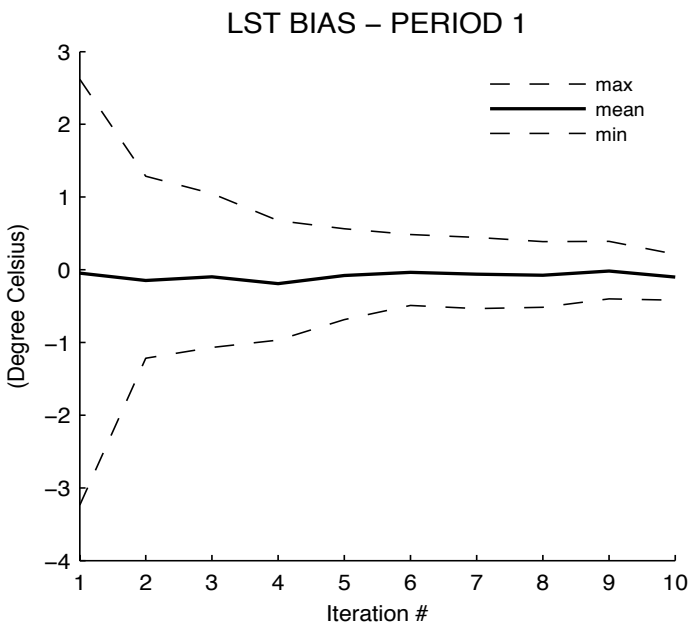


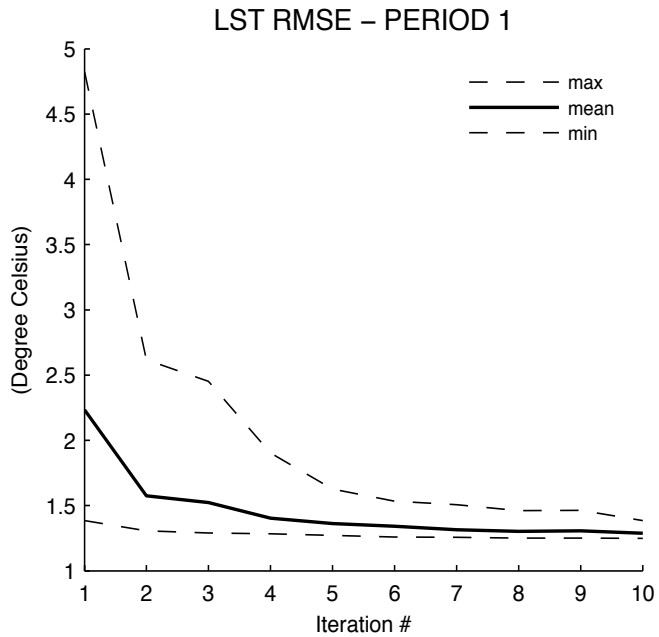
Bondville, IL

Model Optimization

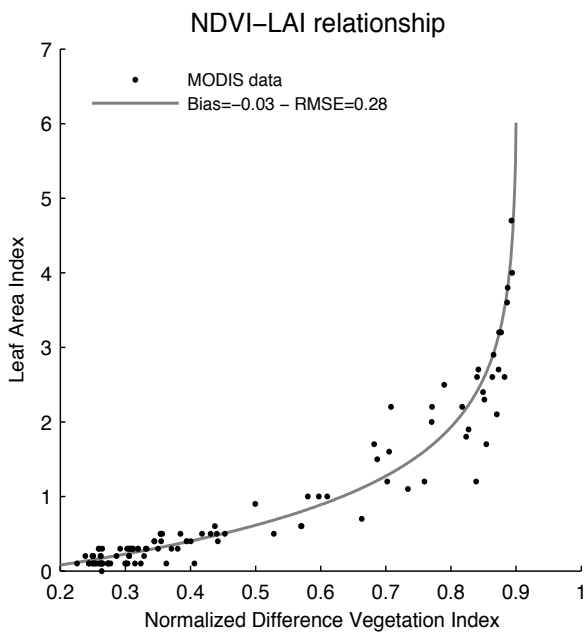


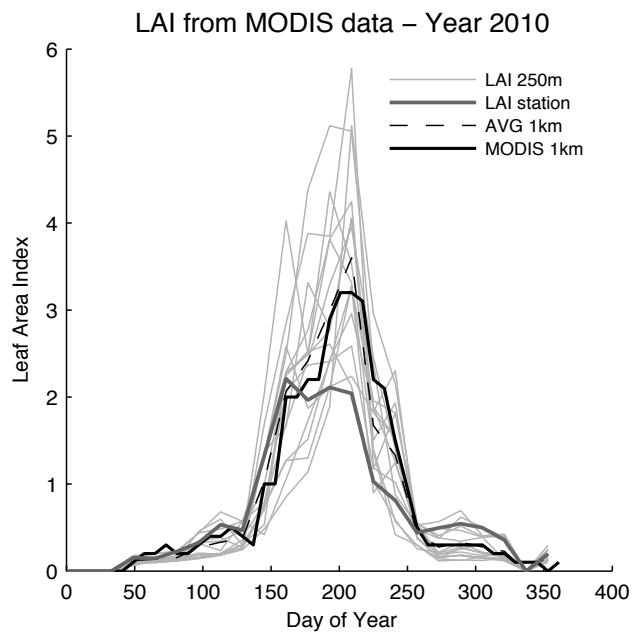
Model optimization



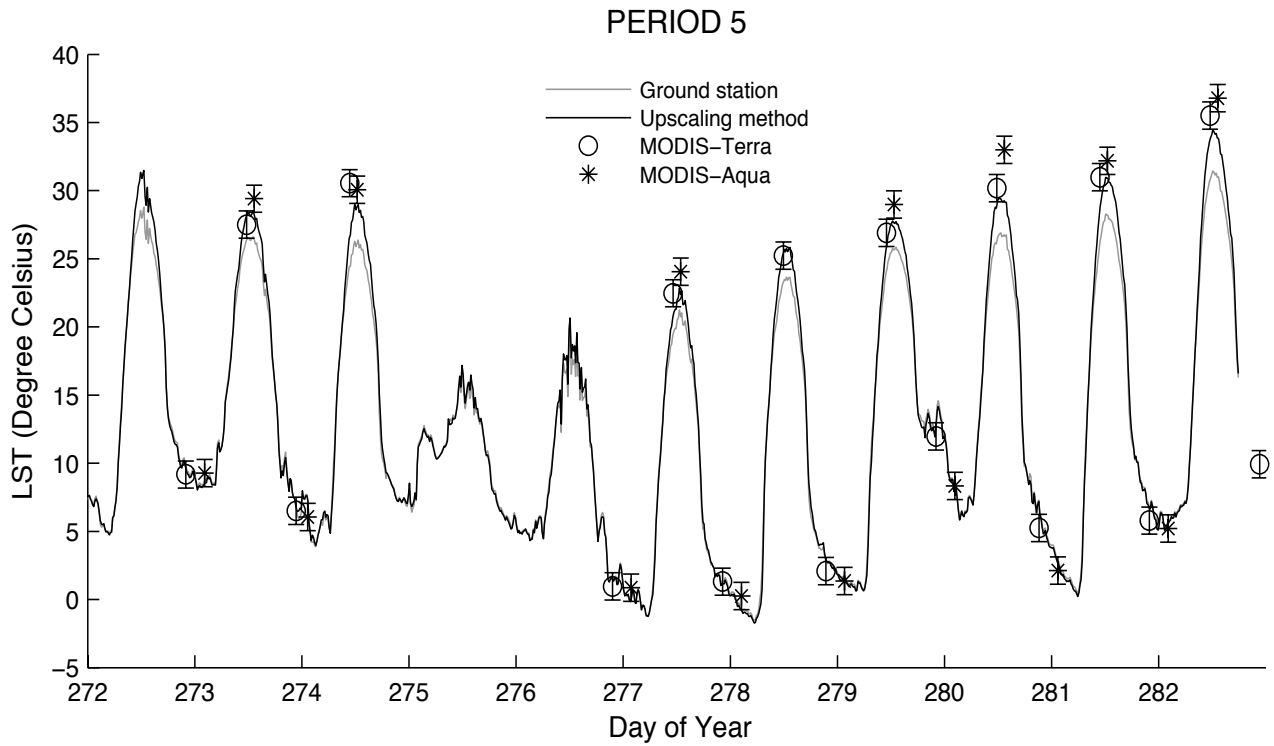


LAI variability



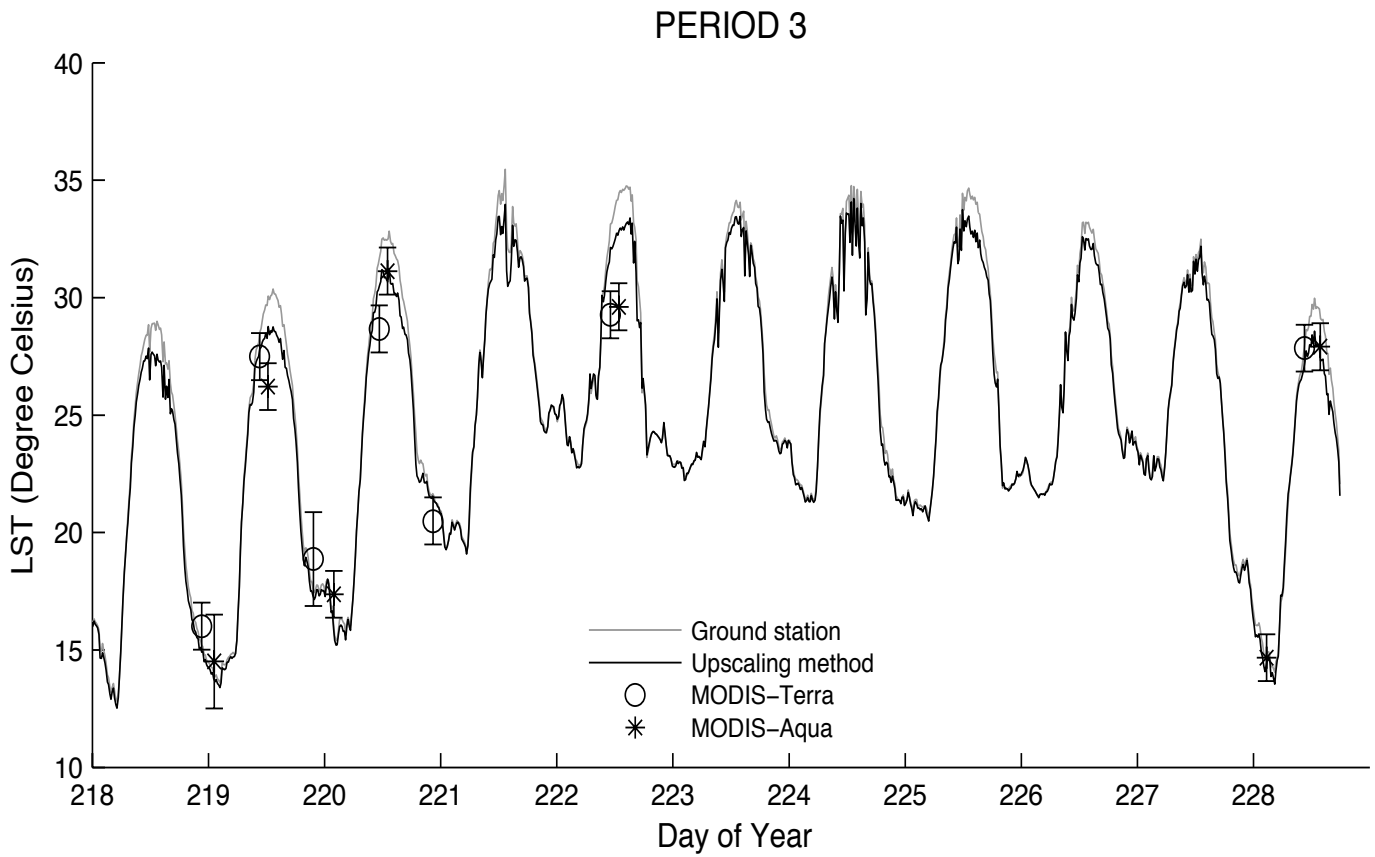


Results – Bondville, IL

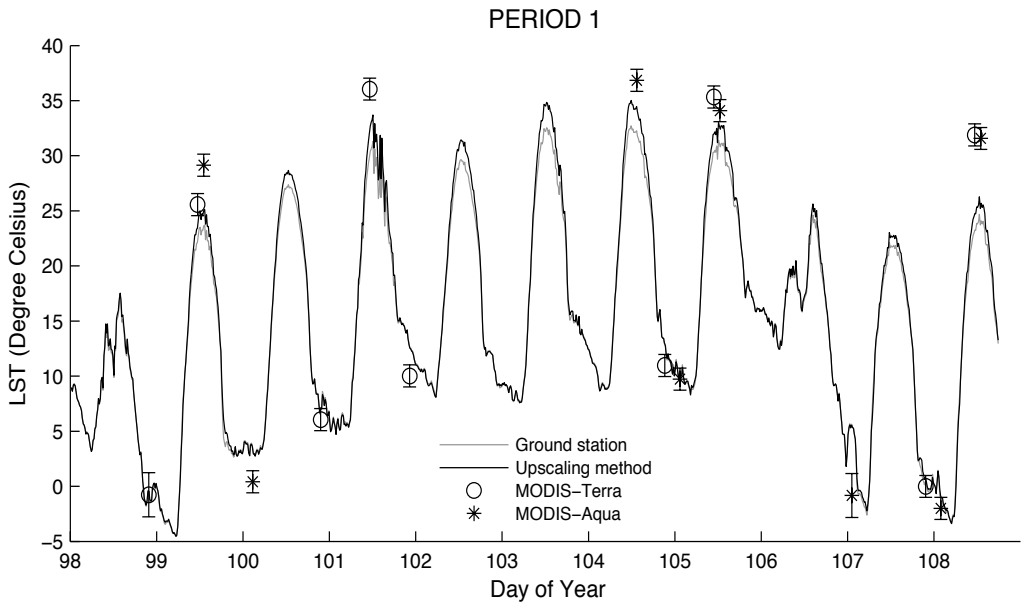


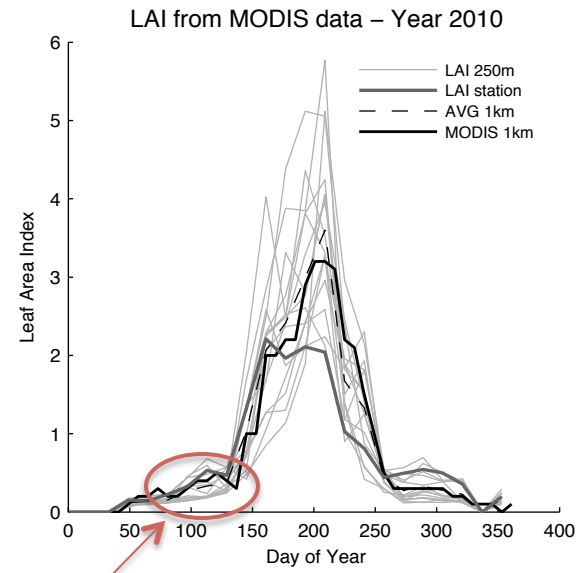
for 2010	**Bias**	**RMSE**
Satellite vs. Station	-1.4	3.1
Satellite vs. Scaled-up data	-0.4	1.9

Results – Bondville, IL



Results – Bondville, IL

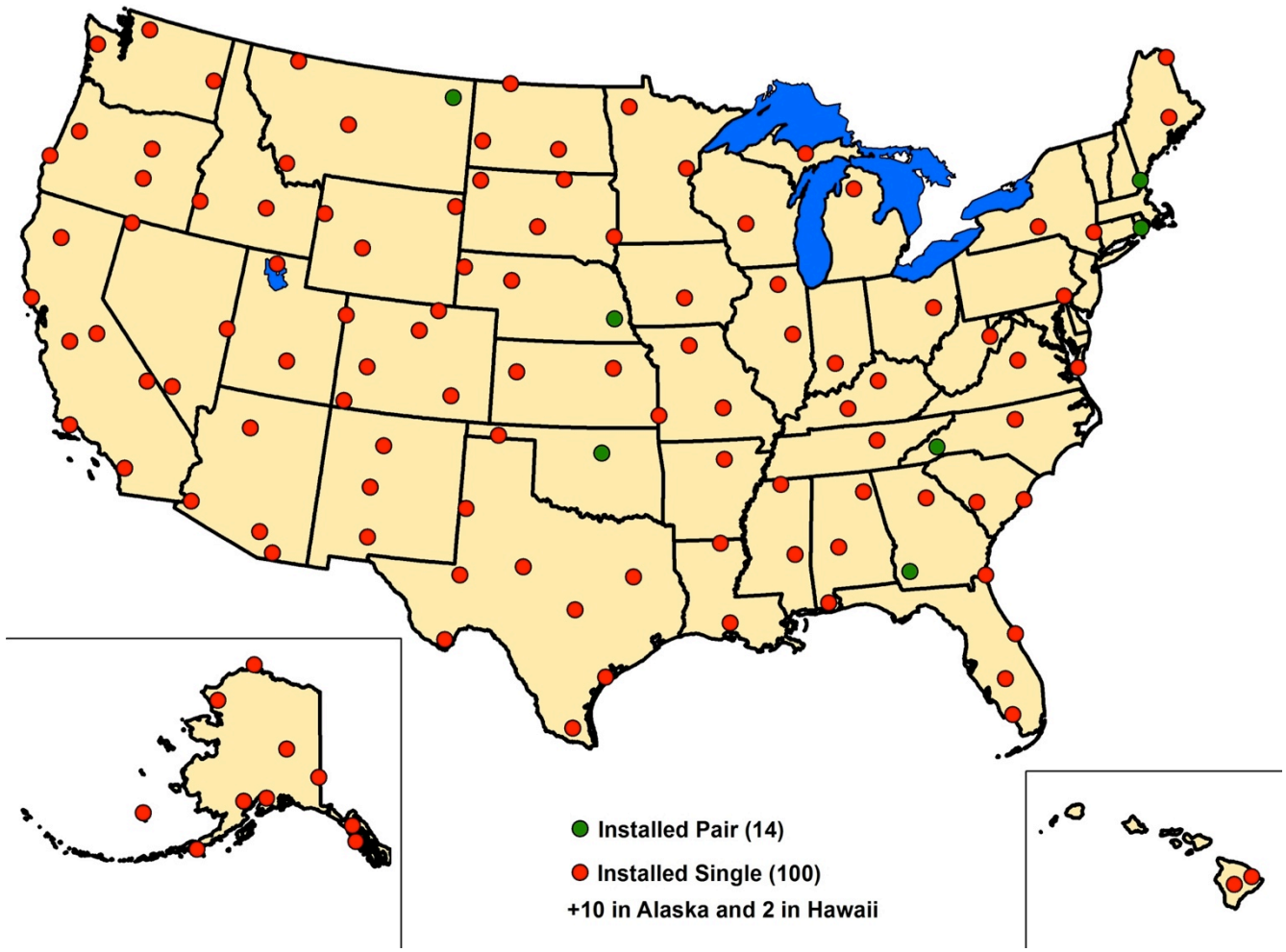




for Period 1 only	**RMSE**
Satellite vs. Station	4.0
Satellite vs. Scaled-up data	3.1

Limitation of the approach:
Ancillary data quality
Low values of vegetation density

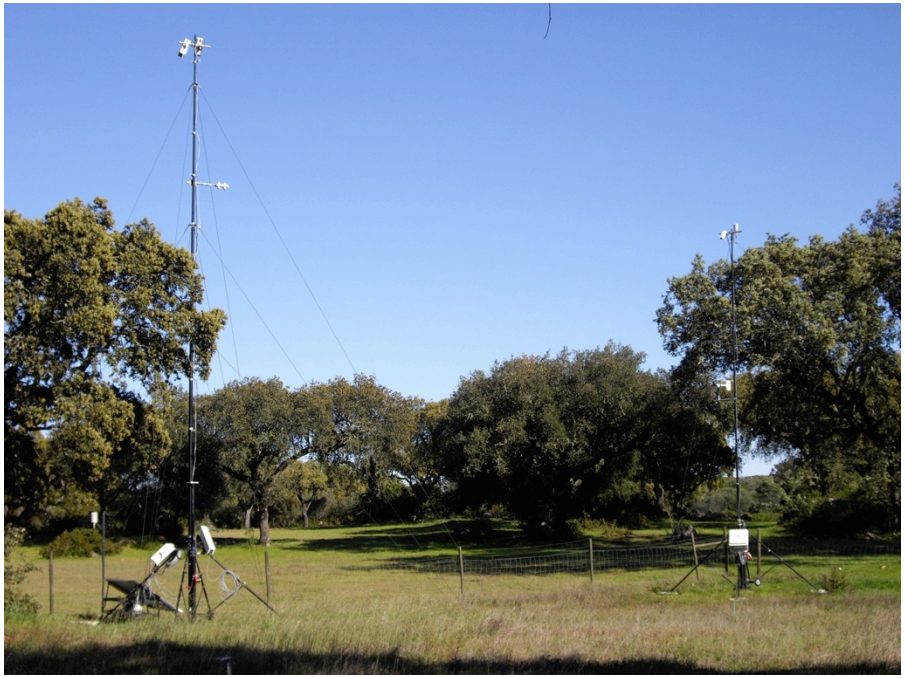
US Climate Reference Network



MSG SEVIRI – EUMETSAT's validation sites

Gobabed, Namibia

Evora, Portugal



Frank Goettsche, KIT, Karlsruhe, Germany

In collaboration with Karlsruhe Institute of technology, Germany

Next

- Increase number of validation/test sites in 2012:
  - US Climate Reference Network
  - European validation stations (EUMETSAT; INRA, France)
  - Ameriflux towers (broadleaf & pine forests)

- Flight campaigns over TN and IL to describe LST spatial variability around specific stations

with: - NOAA's Atmospheric and Turbulent Diffusion Division

- University of Tennessee Space Institute