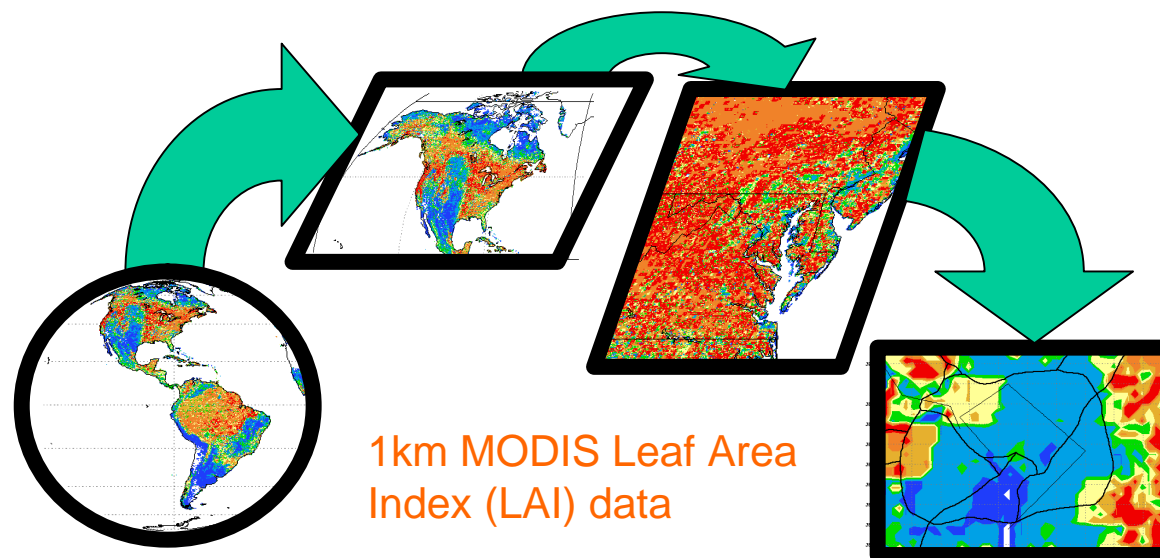


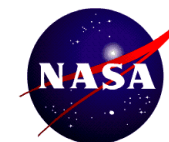


The Land Information System: Thinking Globally, Acting Locally

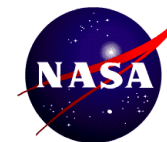
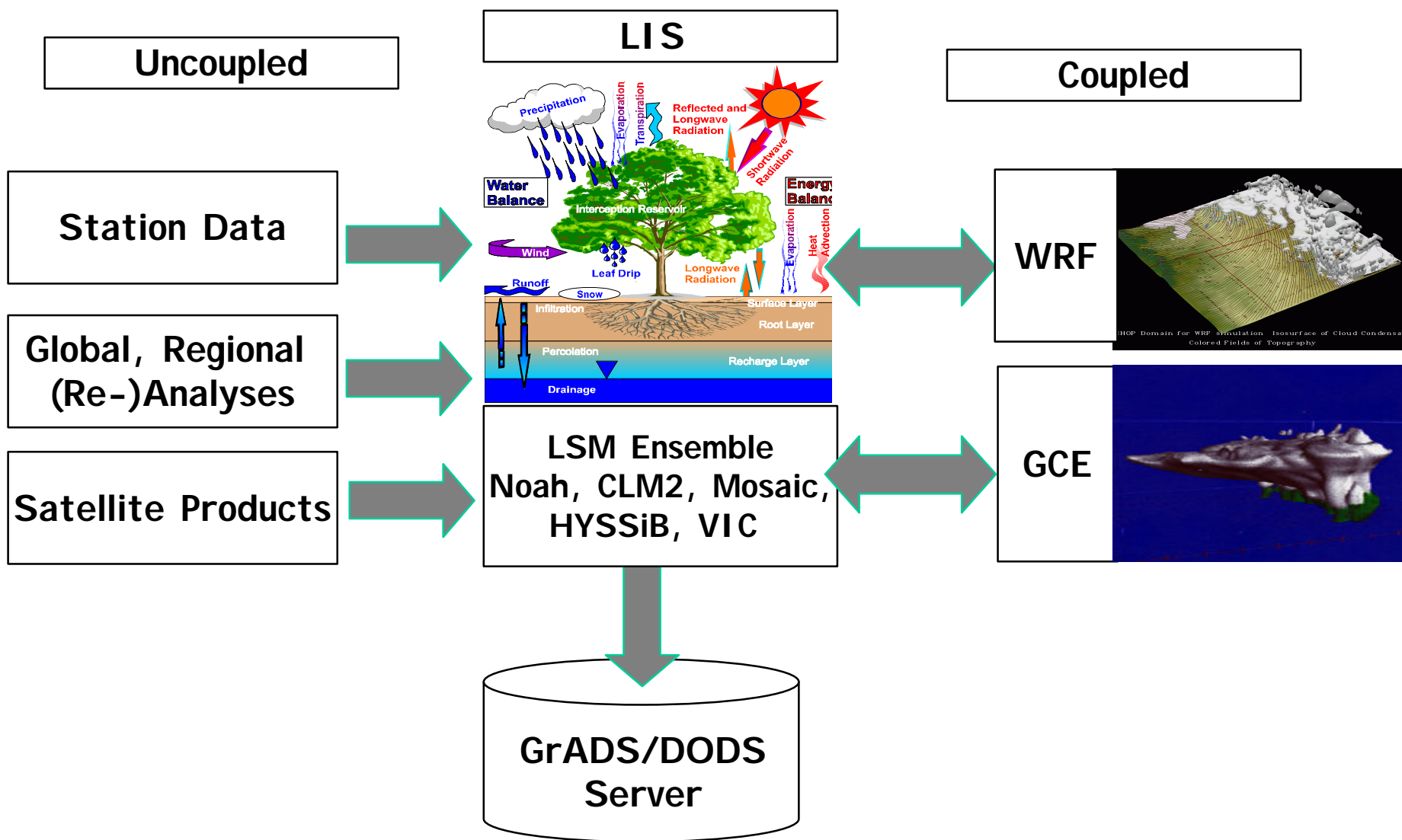
Christa Peters-Lidard, Sujay Kumar, and Matt Rodell
Hydrological Sciences Branch
NASA Goddard Space Flight Center



Code and Documentation at
<http://lis.gsfc.nasa.gov>

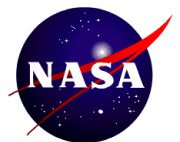


LIS as a CEOP Testbed

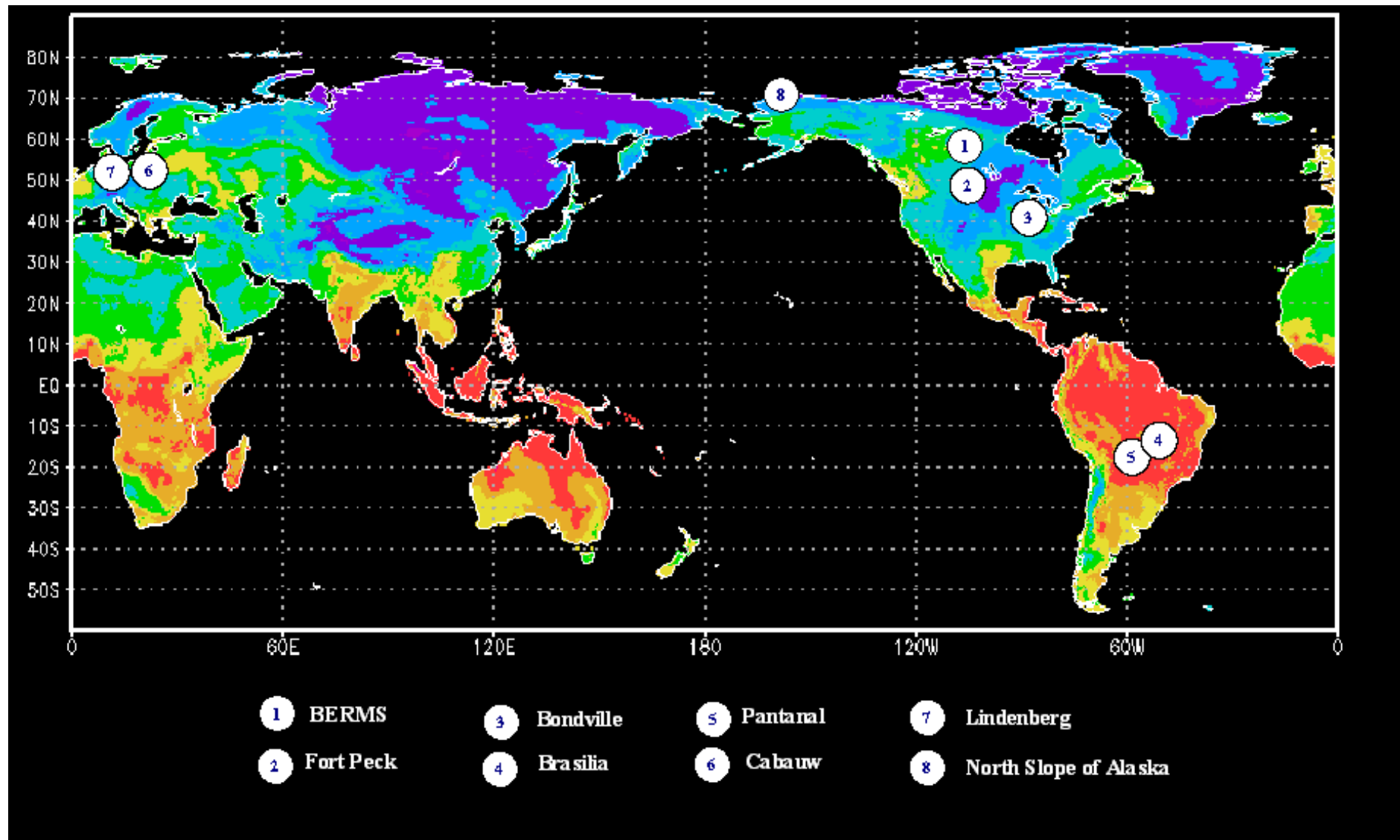


Examples of LIS applications for CEOP

1. LIS Results from selected CEOP Reference Sites
2. LIS Results from a CEOP Hydrology Reference Site

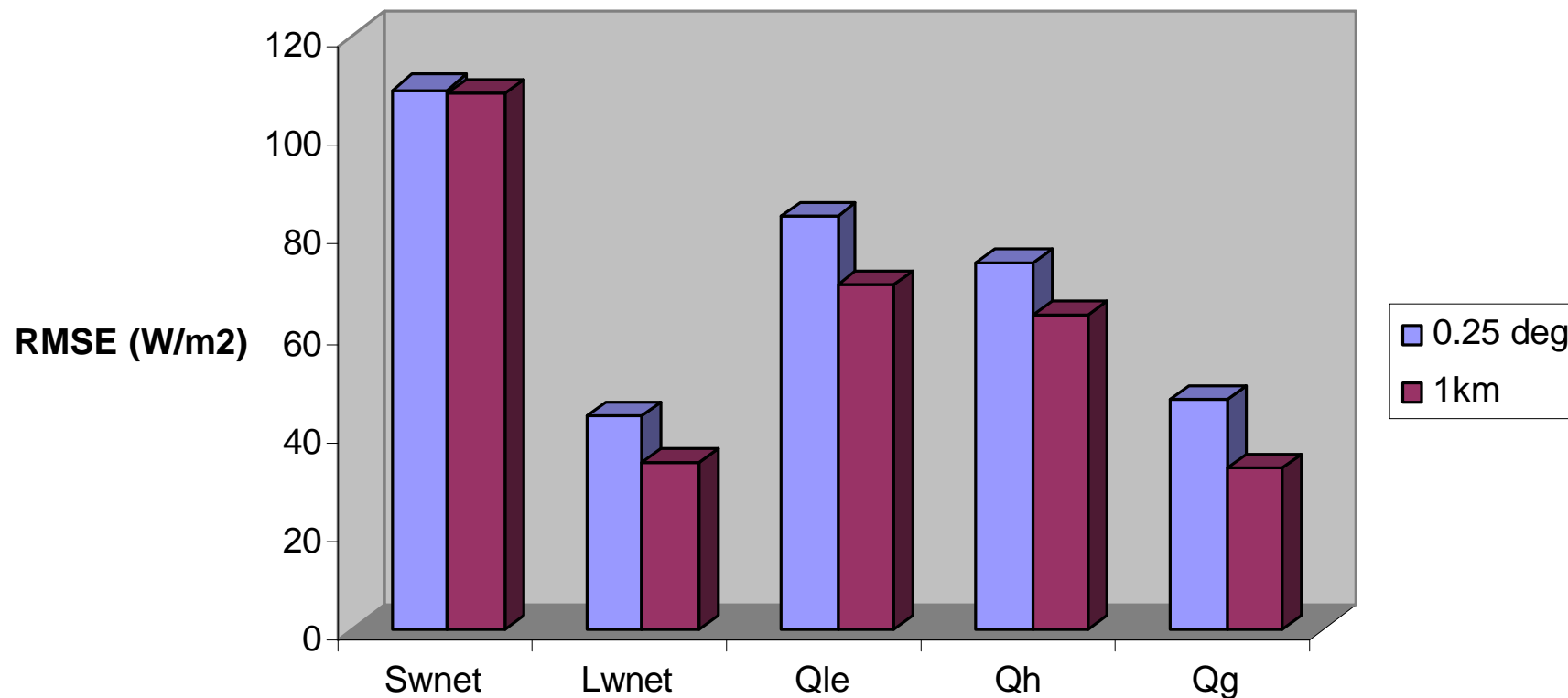


Key CEOP Reference Sites

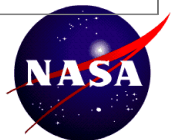
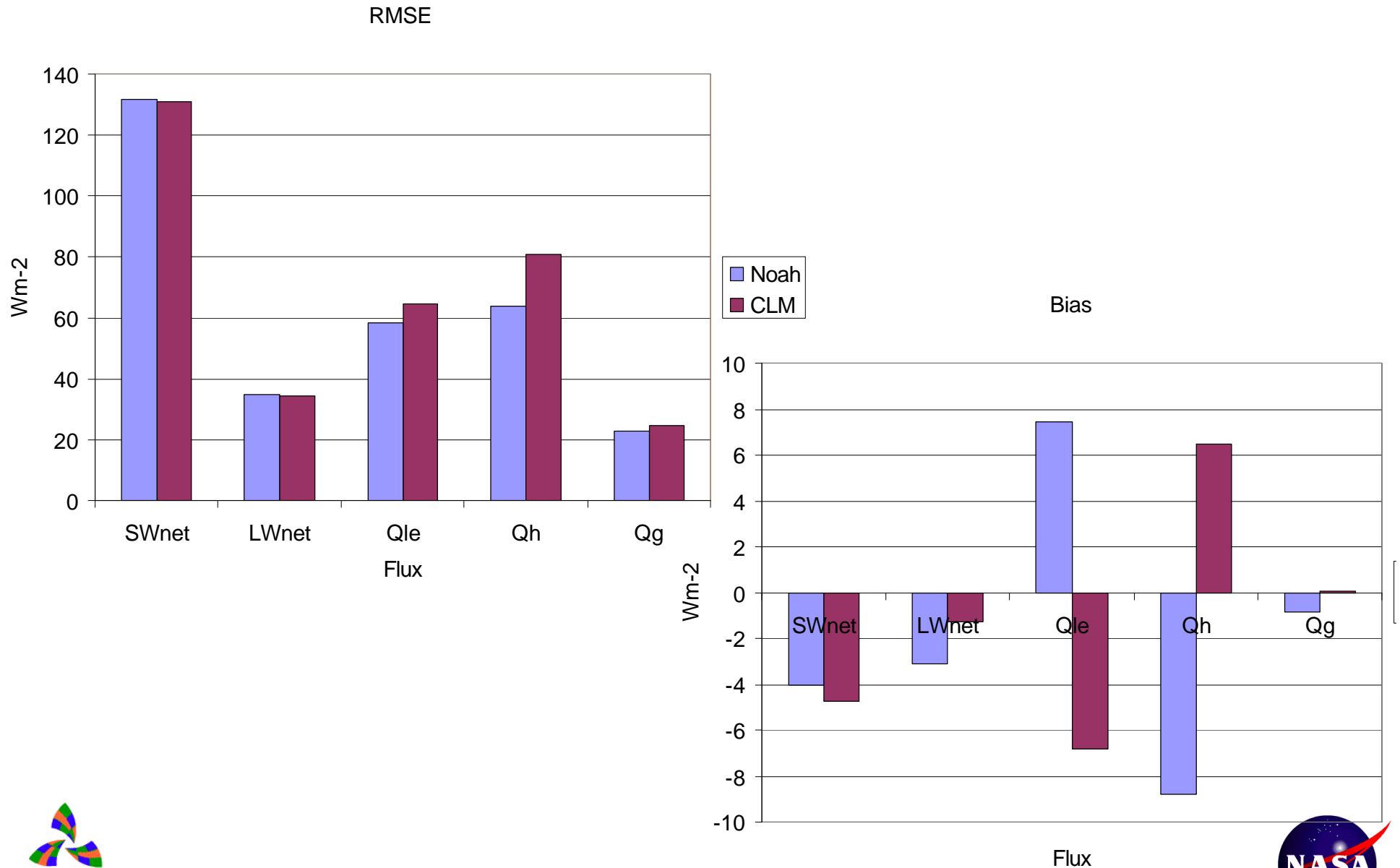


LIS ¼ deg and 1km Ensemble Evaluations

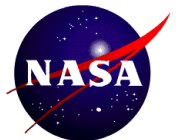
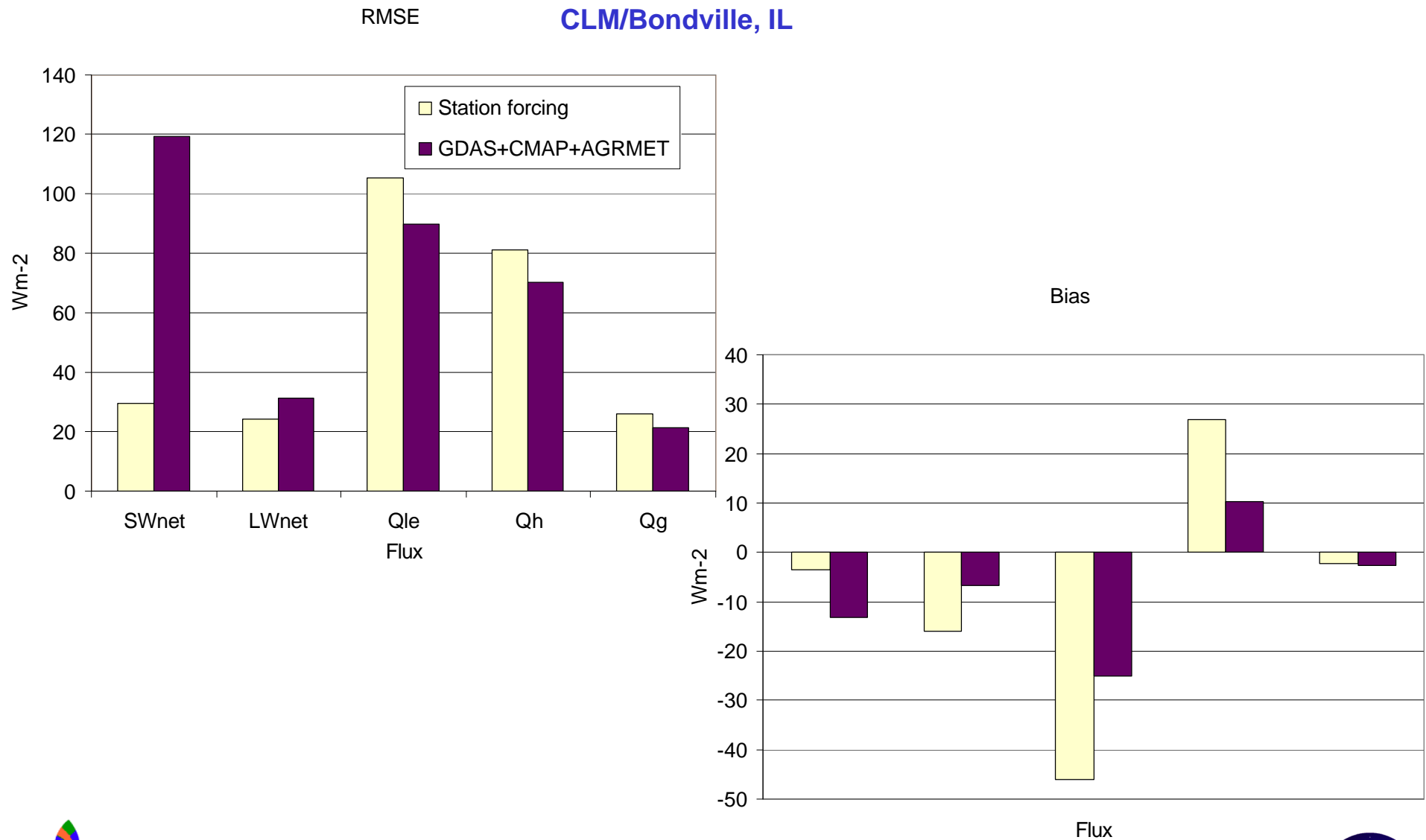
- CLM/Noah/Mosaic ensemble energy fluxes
- GDAS+CMAP+AGRMET forcing
- All CEOP reference sites EOP-1 July 1-Sept 30, 2001



Intermodel Differences

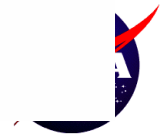
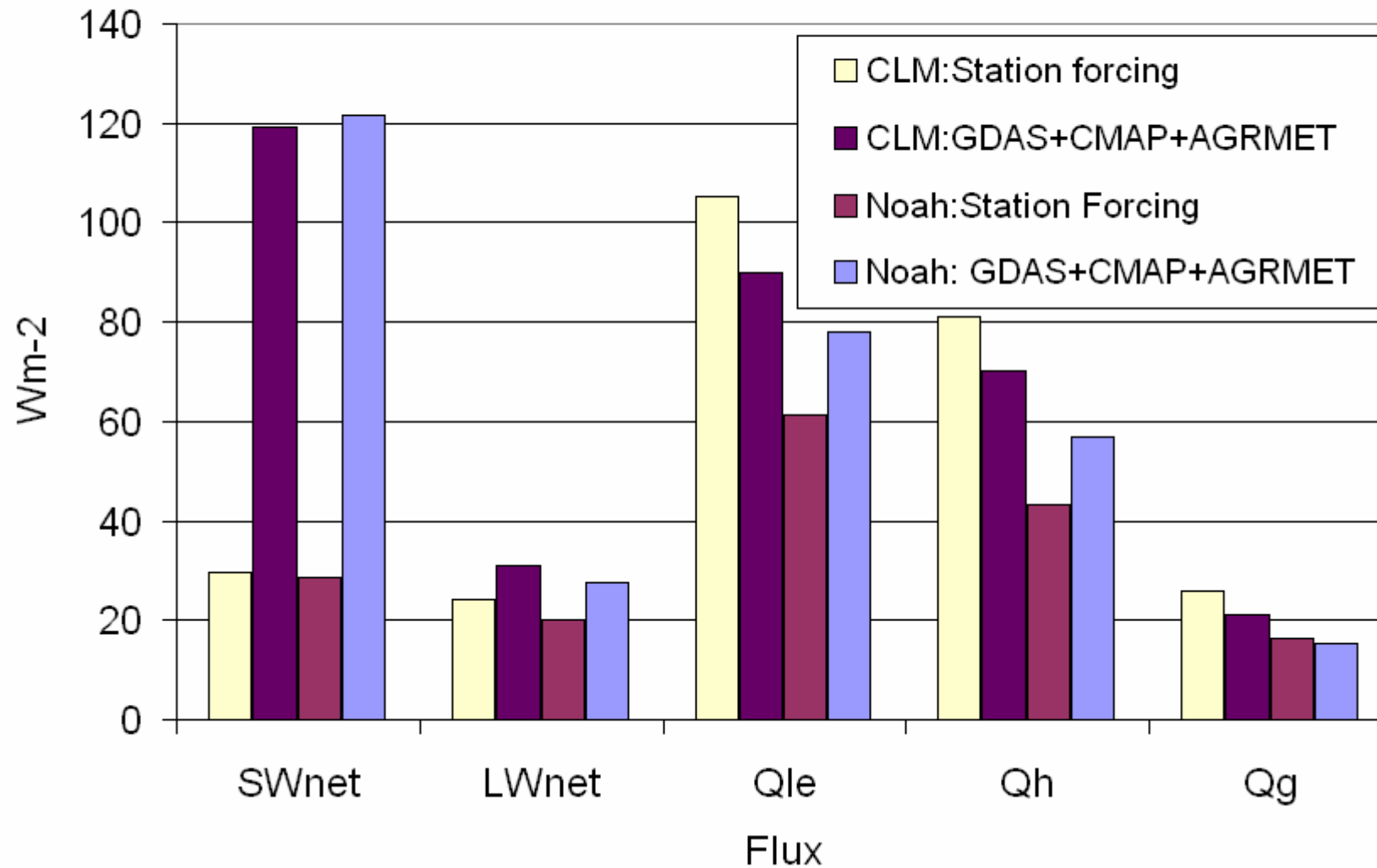


Forcing vs. Model Physics/Parameters:



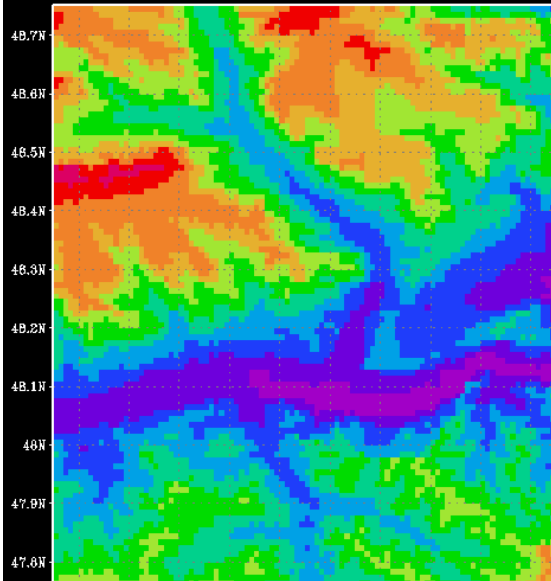
Forcing vs. Model Physics/Parameters:

BON EOP-1 Flux RMS Errors

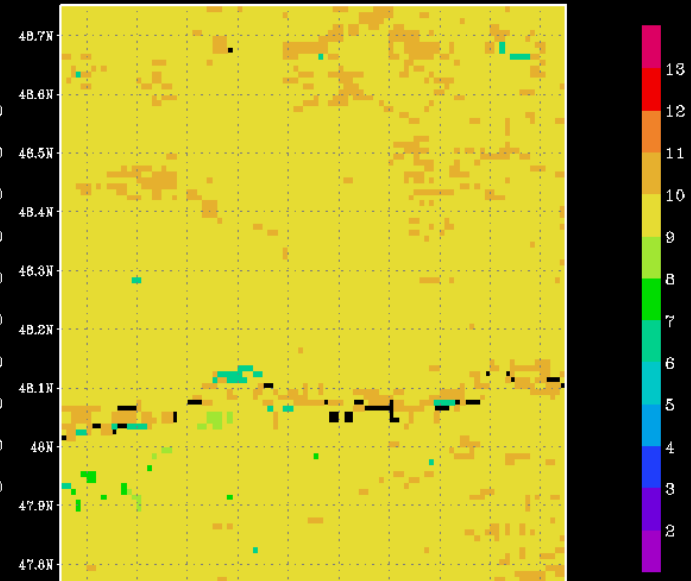


Heterogeneity: Fort Peck, MT

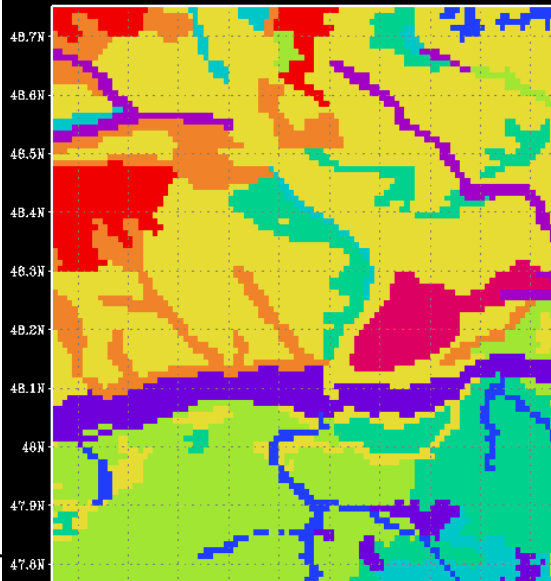
GTPO30 elevation (m)
in the vicinity of Fort Peck, MT



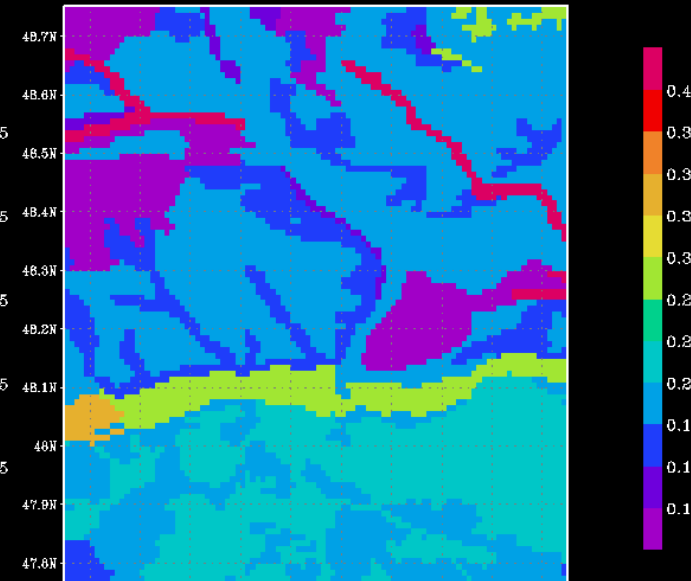
UMd vegetation types
in the vicinity of Fort Peck, MT



STATSGO sand content
in the vicinity of Fort Peck, MT



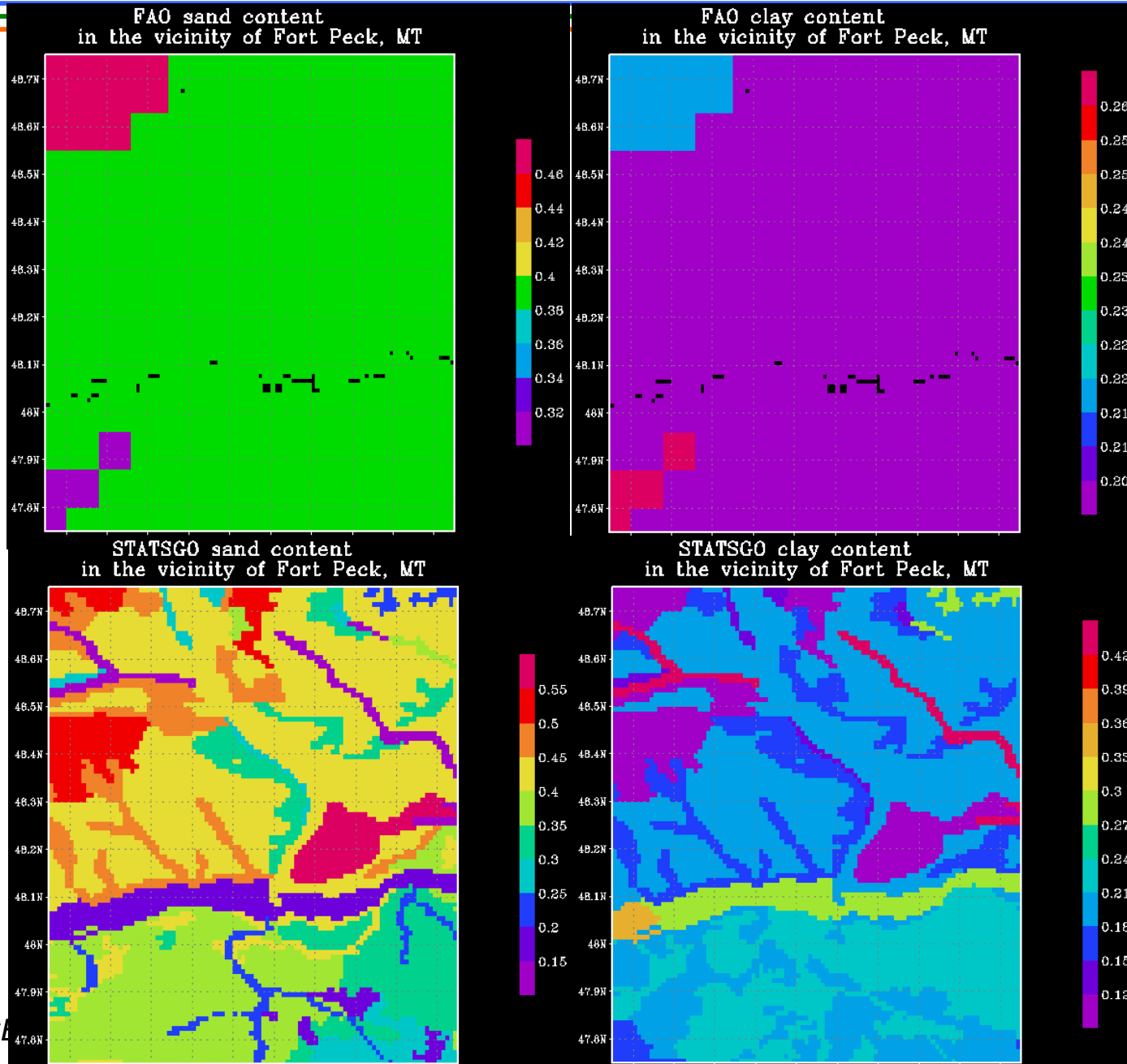
STATSGO clay content
in the vicinity of Fort Peck, MT



CE



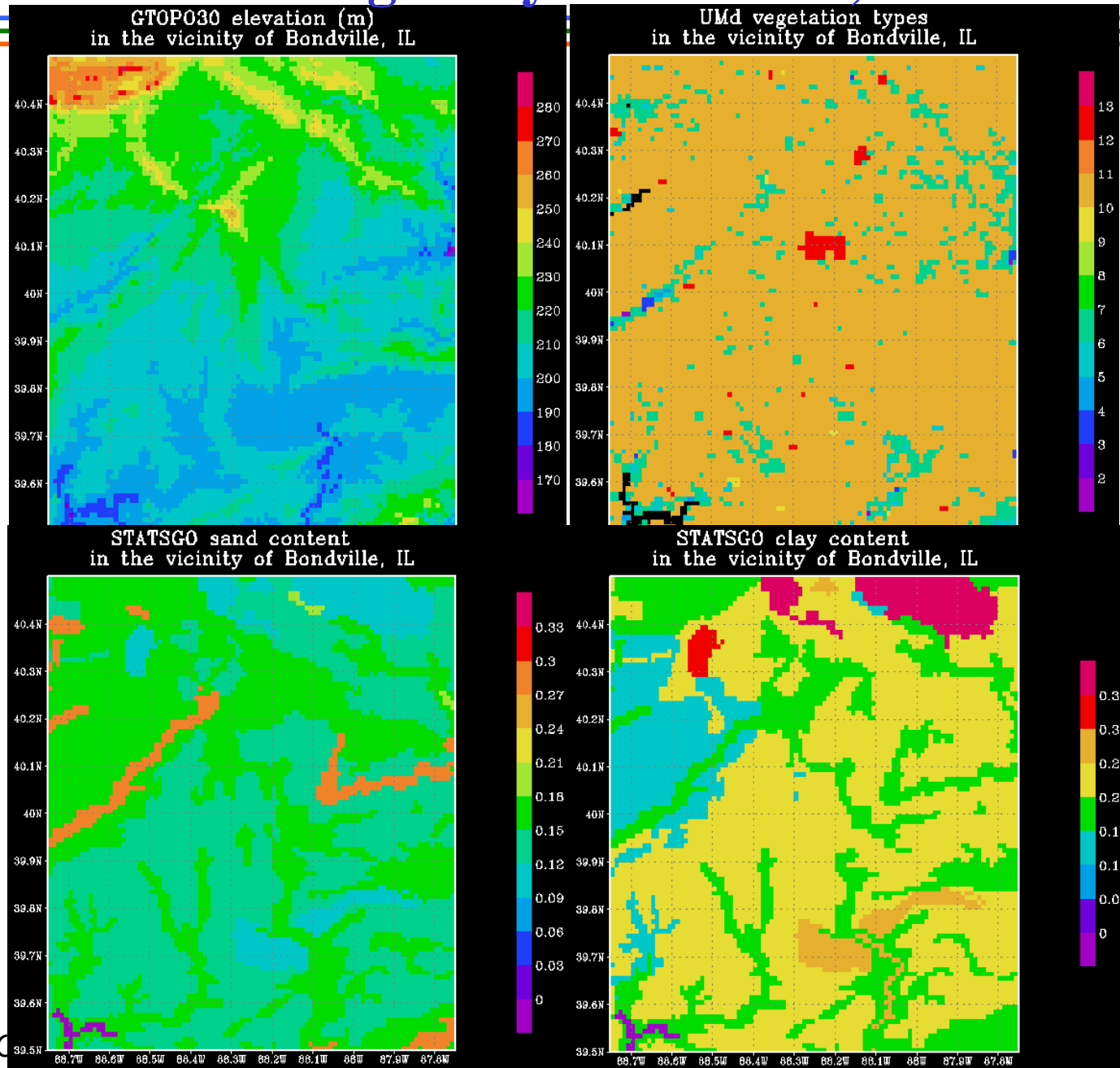
Soil Heterogeneity: Fort Peck, MT



Cl



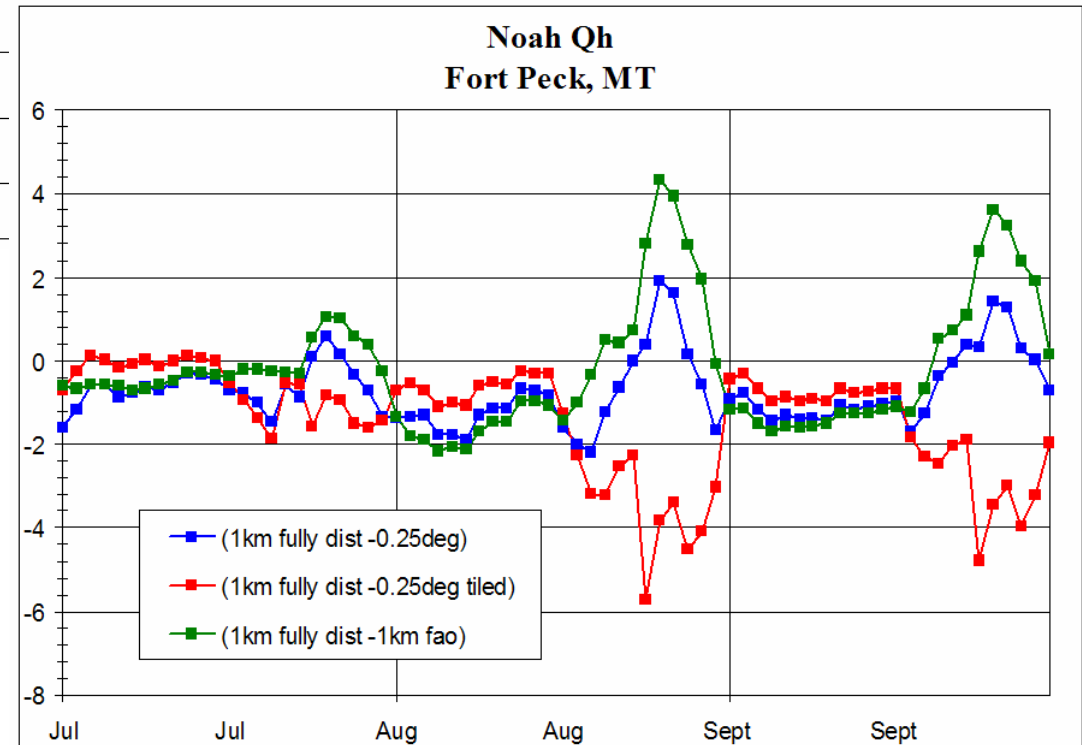
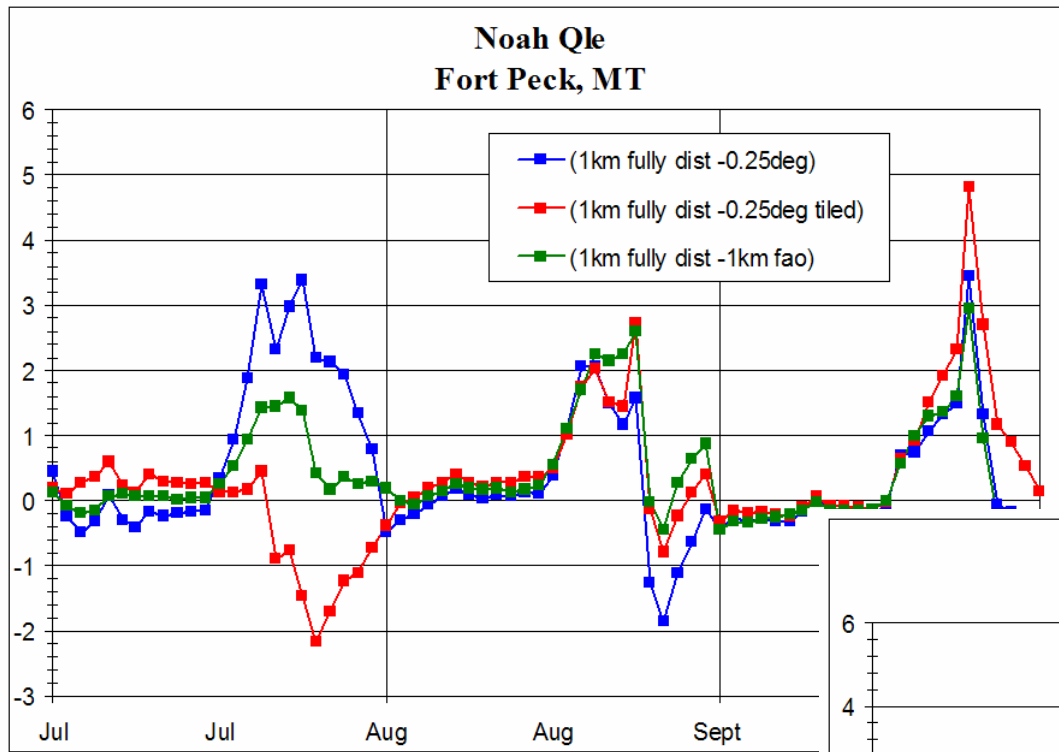
Heterogeneity: Bondville, IL



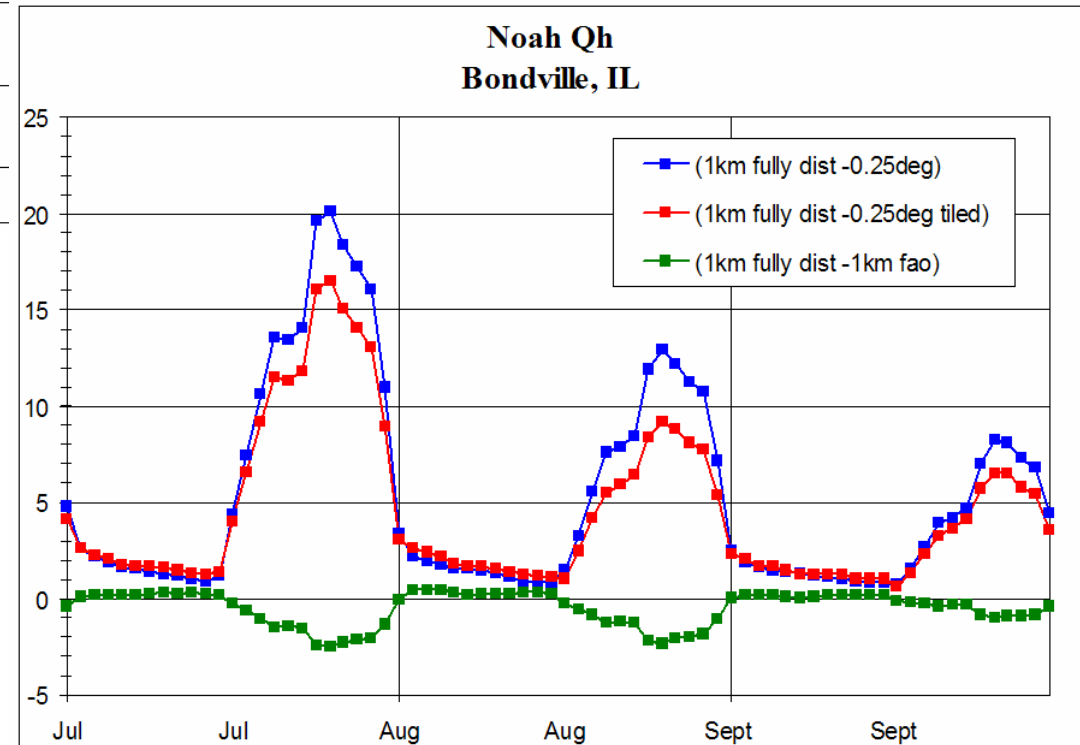
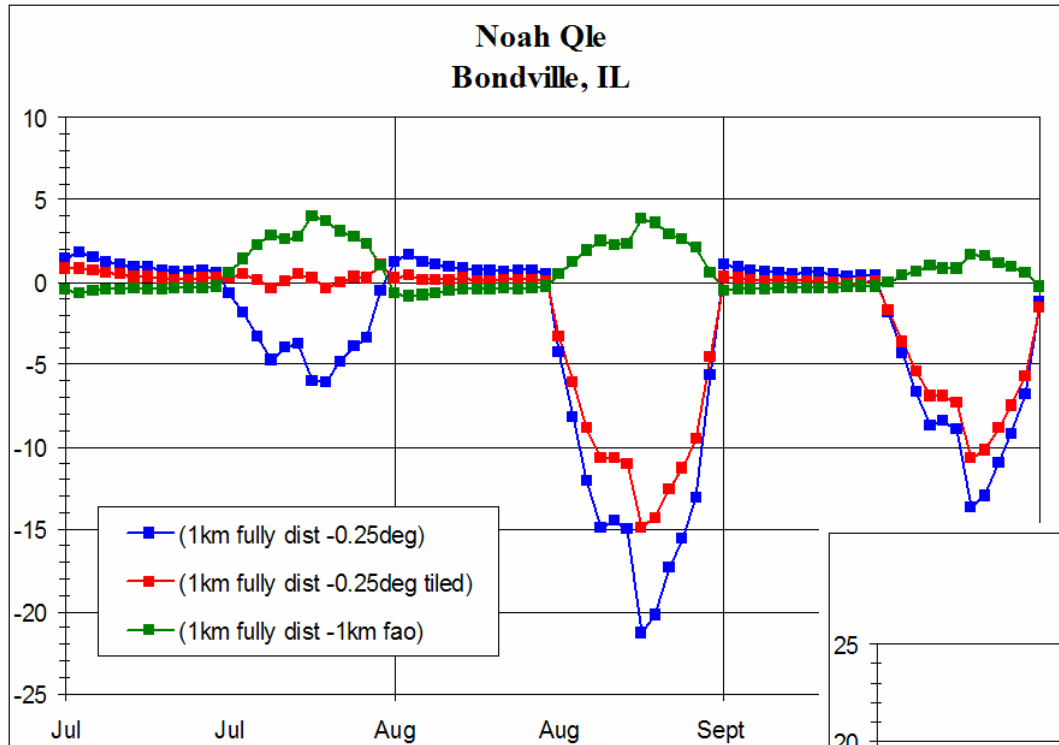
CEC



Uncoupled heterogeneity impact: Fort Peck, MT



Uncoupled heterogeneity impact: Bondville, IL





CEOP HYDROLOGY REFERENCE SITES

What is this?

Candidate Sites

- > Kyeamba Creek (Australia)
- > Sleeve Polder (Ireland)
- > **Walnut Gulch (US)**
- > Igarape Asu (Brazil)
- > Zwalm River (Belgium)
- > Volta River (Ghana)
- > Wolf Creek (Canada)
- > Naqu River (China)

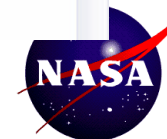
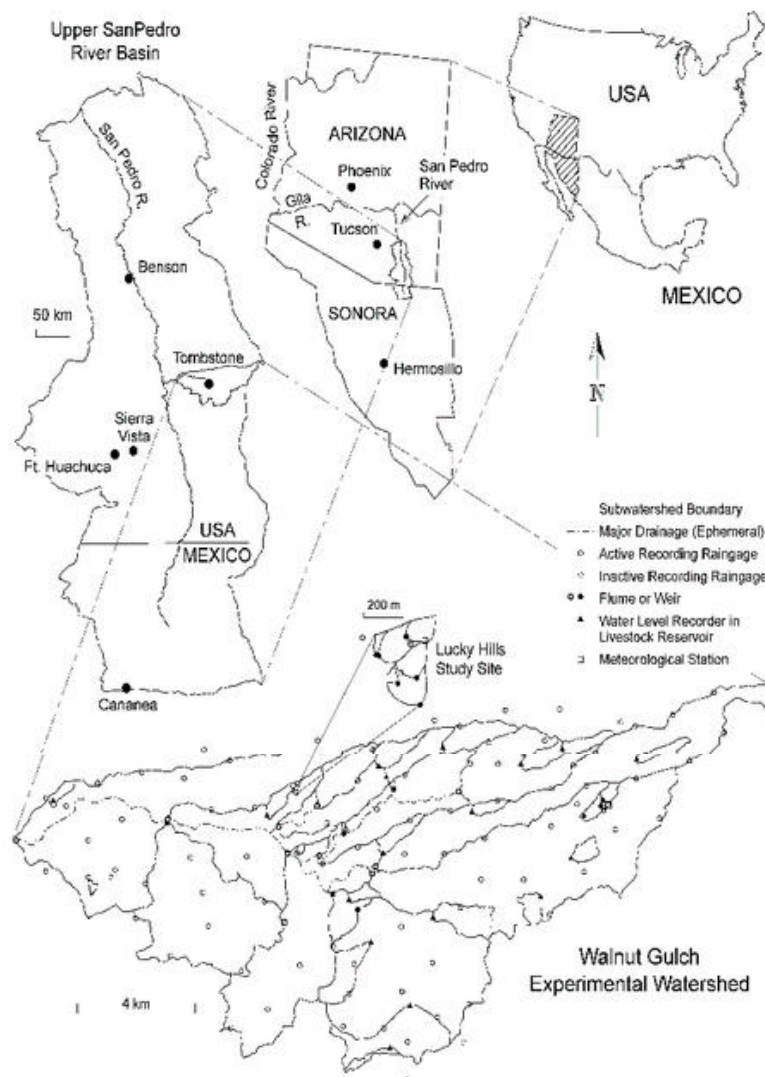
Submit Your Site

Current Entries

Walnut Gulch, Arizona, USA

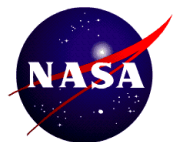
Site Summary

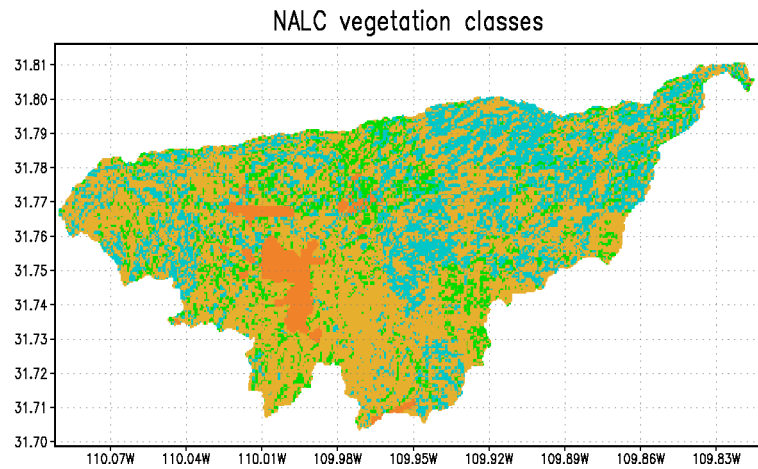
Walnut Gulch Experimental Watershed is operated by the United States Department of Agriculture, Agricultural Research Service, Southwest Watershed Research Center located in Tucson, Arizona. The Walnut Gulch Experimental Watershed encompasses the 150 square kilometers in southeastern Arizona, USA draining to the outlet gage at (31° 43' N, 110° 41' W) that surrounds the historical western town of Tombstone. The watershed is contained within the 7600 km² upper San Pedro River Basin flows north from Sonora, Mexico into Arizona. The watershed is representative of approximately 60 million hectares of brush and grass covered rangeland found throughout the semi-arid southwest and is a transition zone between the Chihuahuan and Sonoran Deserts. Elevation of the watershed ranges from 1250 m to 1585 m MSL. Cattle grazing is the primary land use. Annual precipitation is 350 mm; mean annual temperature is 17.7°C; potential ET is 2600mm. Walnut Gulch is an ephemeral tributary of the San Pedro River and is dry about 99% of the time. Hydrometeorological and soil erosion/sedimentation data are collected from 125 instrumented installations on WGEW. Precipitation is measured with a network of 88 weighing-type recording rain gauges arranged in a grid throughout the watershed. Various runoff measuring structures are used to monitor runoff from eight small subcatchments (< 40 ha). These structures include broad-crested V-notch weirs, H-flumes, and Santa Rita supercritical flow flumes. Runoff from



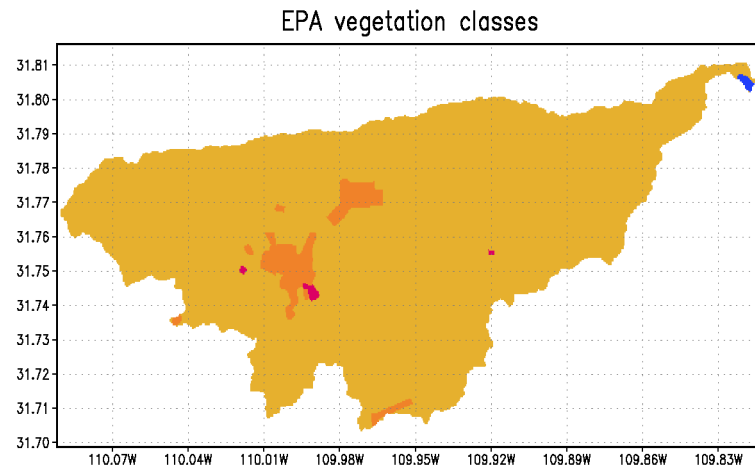
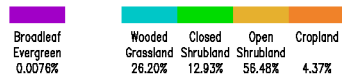
Monsoon '90 LIS Experiments for Walnut Gulch

- NOAH 2.6
- 10 soil layers (in cm):
 - 5, 5, 5, 5, 10, 20, 20, 40, 60, 80
- Precipitation interpolation:
 - Multi-quadric; 84 gauges
- Vegetation Inputs:
 - NALC, EPA, MODIS
- Soils Inputs:
 - SSURGO, STATSGO, FAO

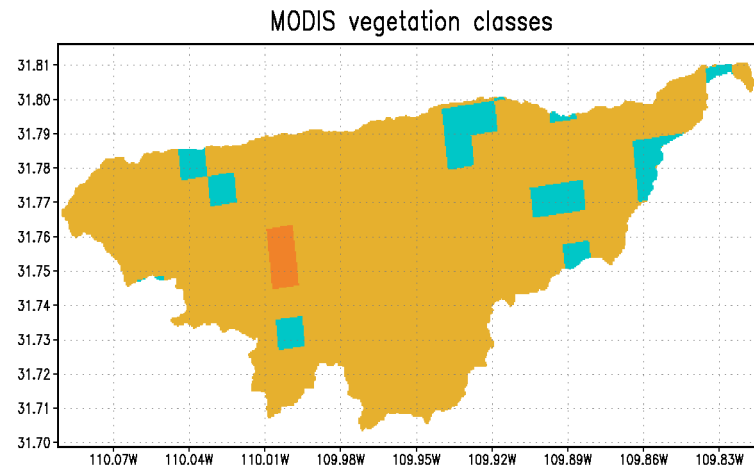
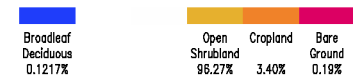




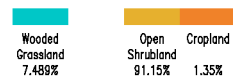
NALC vegetation classes



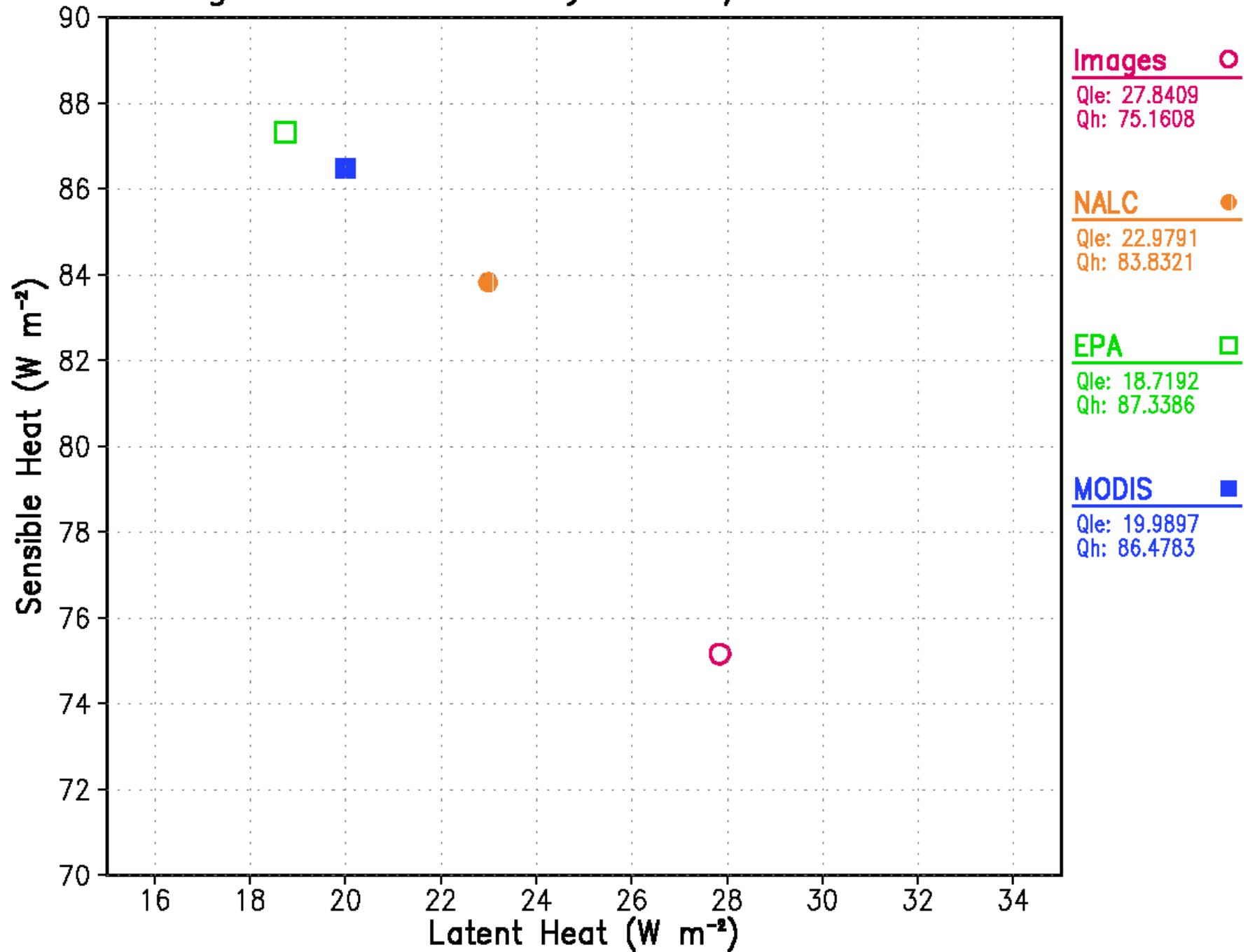
EPA vegetation classes



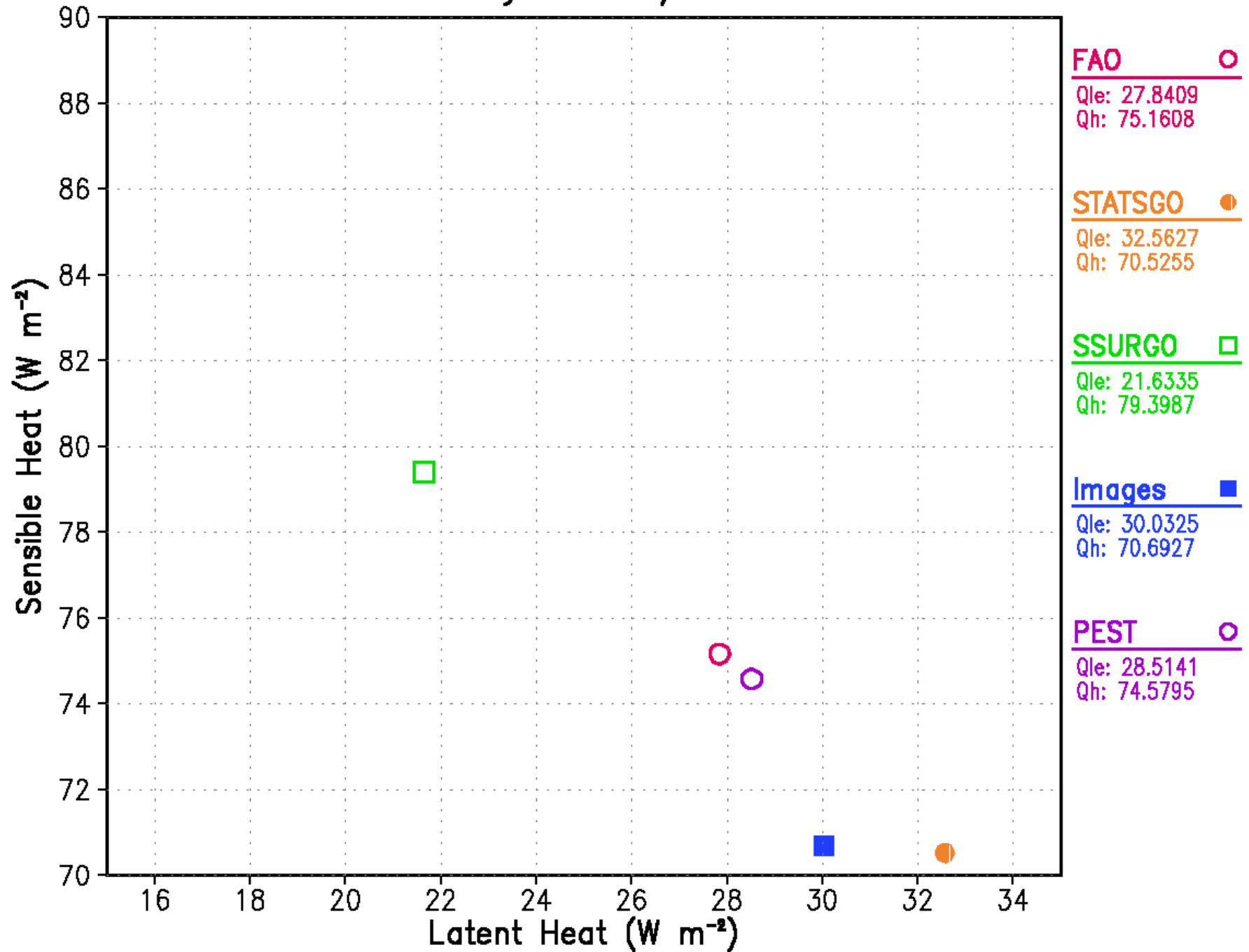
MODIS vegetation classes



Vegetation Uncertainty Latent/Sensible Heat



Soil Uncertainty Latent/Sensible Heat



Summary

- LIS is a testbed for studying land atmosphere interactions at multiple scales for CEOP
- Satellite-based products yield significant mesoscale information
- Significant covariance among parameters yields nonlinear averaging of fluxes

Acknowledgement

LIS is a Grand Challenge Investigation funded under NASA ESTO/CT CAN-00-OES-01, with additional support from NASA ESTO/AIST NRA-02-OES-04

