Preliminary results of model-data intercomparison for the NACP Site-Level Interim Synthesis

Peter Thornton[1], representing 90+ NACP Site Synthesis participants

[1] Oak Ridge National Laboratory

Objective

Establish quantitative framework and answer the question:

“Are the various measurement and modeling estimates of carbon fluxes consistent with each other - and if not, why?”

NACP Site Synthesis Overview

- 47 sites in Canada and the U.S.
- 22 models
- Comprehensive protocol for participation
- Consistent, quality-controlled model driving datasets (meteorology)
- Gap-filled (and unfilled!) fluxes, with consistent uncertainty analysis (Barr talk)
- Detailed ancillary and biological data for model evaluation and parameterization

Organized via wiki…

Welcome: Site-Level NACP Interim Synthesis Wiki

Participating Eddy Covariance Flux Towers
Participating Models
Model Output
Gap-Filled Meteorology
Gap-Filled Fluxes with Uncertainty
Ancillary Data and Metadata
Remotely Sensed Phenology
Other Observations
Participants (link to NACP-sponsored email list, requires NACP website login)
Email archive (requires NACP website login)
Protocol
Submission Tools
Presentations
Notes from Mini-Worshop, AGU, December 17, 2009
Timeline
Fair Use Policy

Site distribution

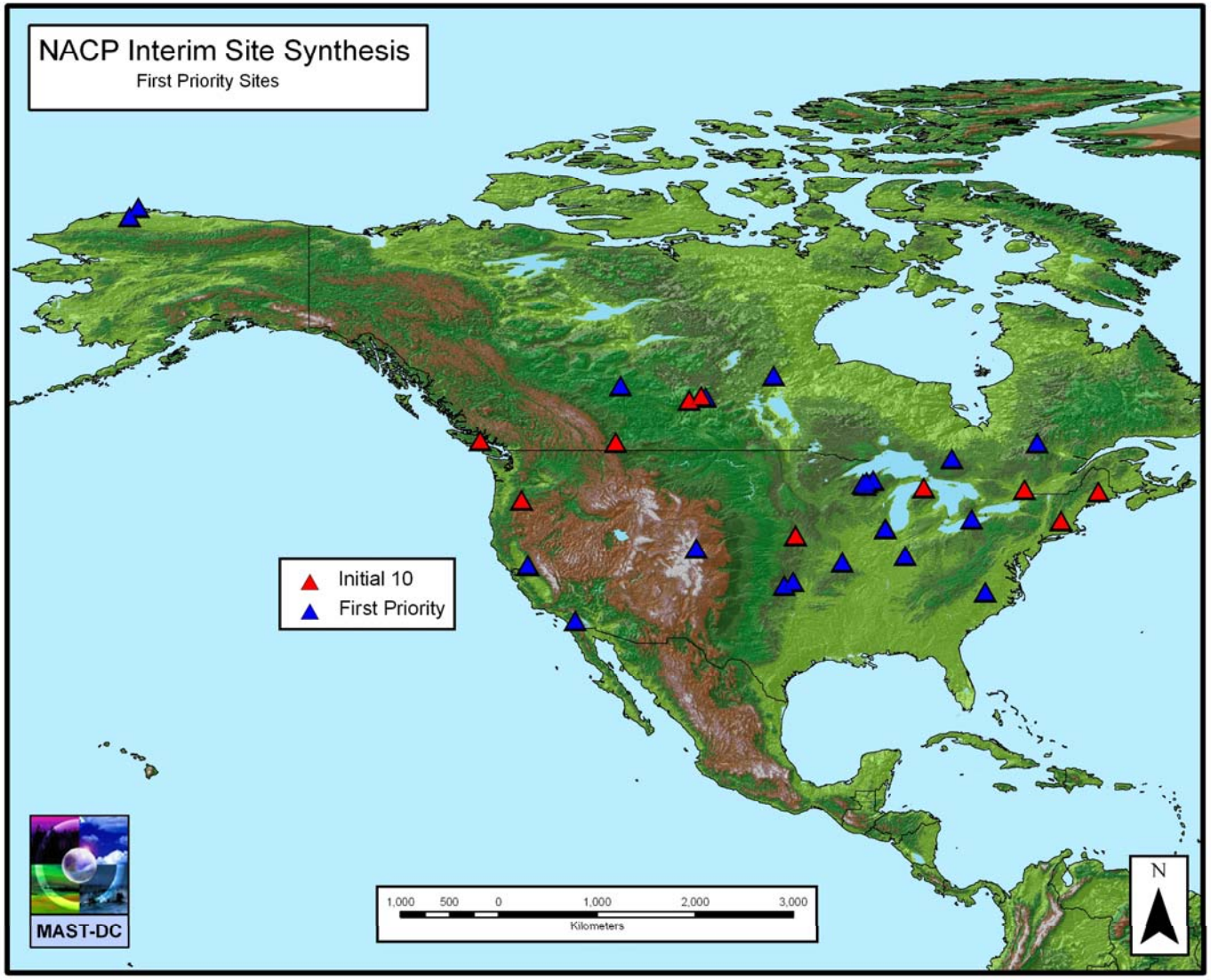


Image credit: Kevin Schaefer

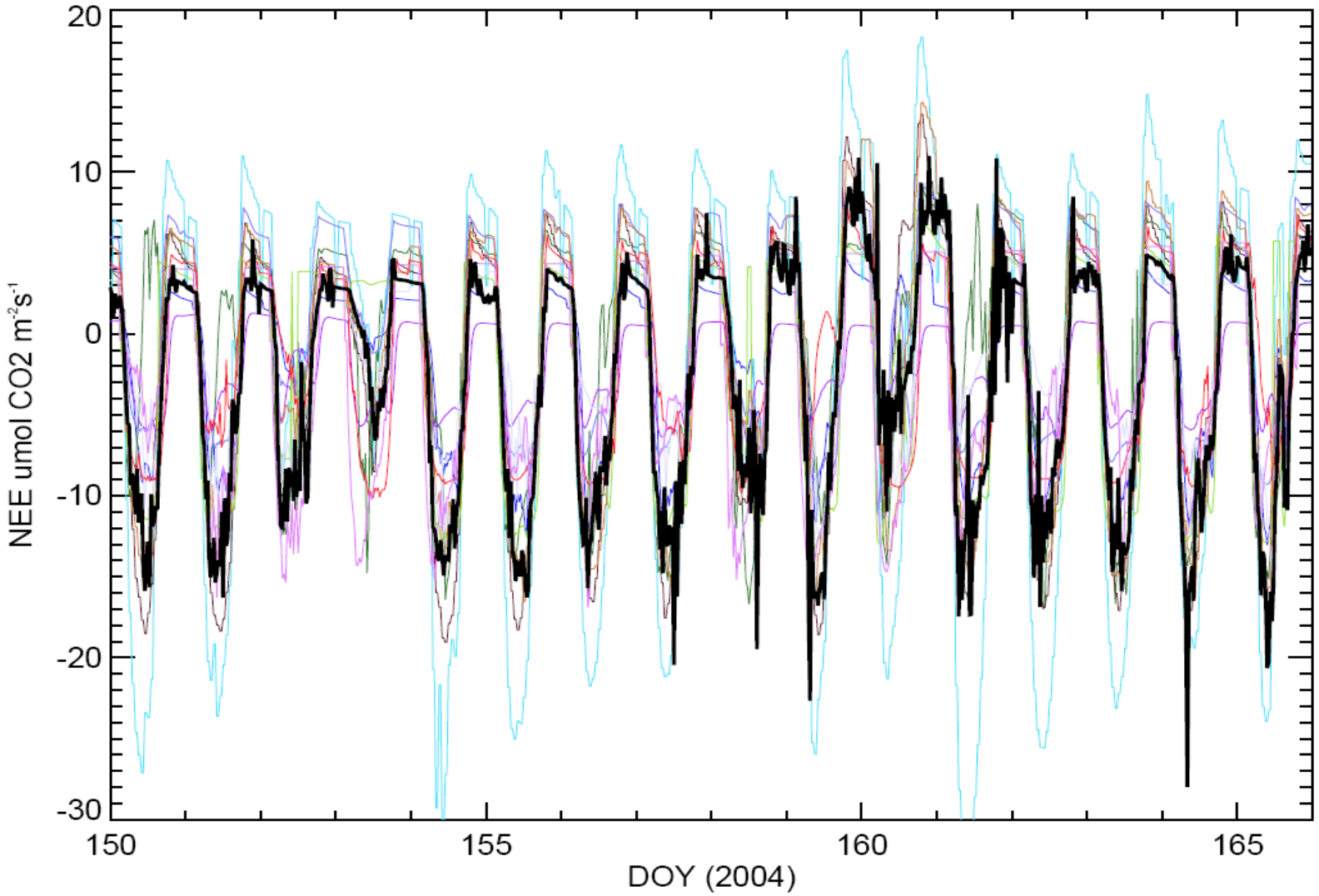
Distribution across veg types

- Crops – 5
- Grass – 4
- Deciduous broadleaf forest – 7
- Evergreen forest (boreal) – 4
- Evergreen forest (temperate) – 6
- Mixed forest – 3
- Shrubs – 2
- Tundra – 2
- Wetland - 3

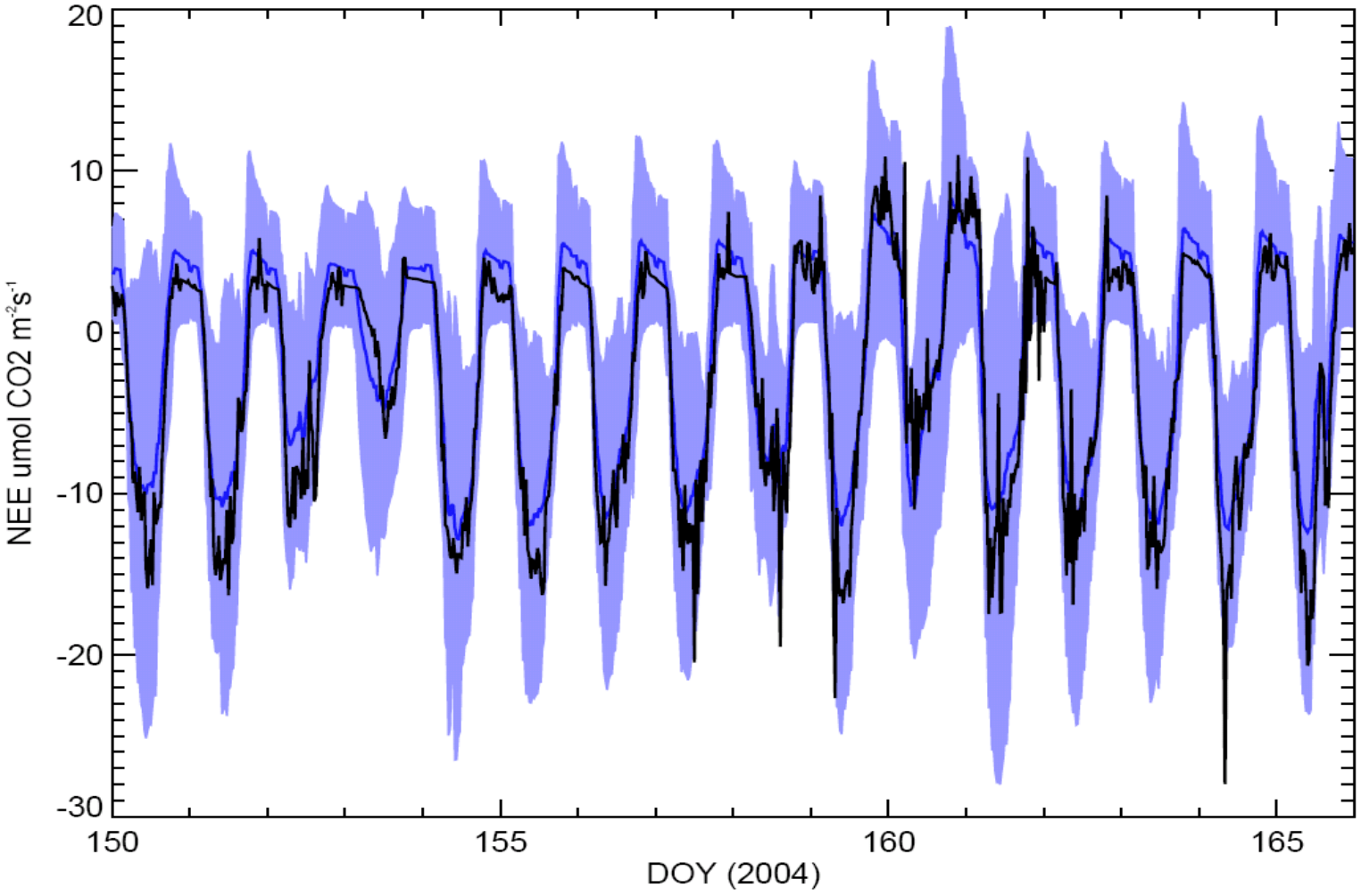
Participating models

Model	
	EDCM
Biome-BGC	GTEC
Can-IBIS	ISO-LSM
CLASS-CTEM (TRIPLEX-Flux)	LoTEC
CLM-CASA'	LPJml
CLM-CN	ORCHIDEE
CN-CLASS	SiB3
DAYCENT	SiBCASA
DLEM	SiBcrop
DNDC	SIPNET
ecosys	SSiB2
ED	TECO

Multi-model comparison: diurnal cycle (Howland)



Multi-model comparison: diurnal cycle (Howland, with model 95%CI)



Multi-model comparison: diurnal cycle (Howland growing season mean)

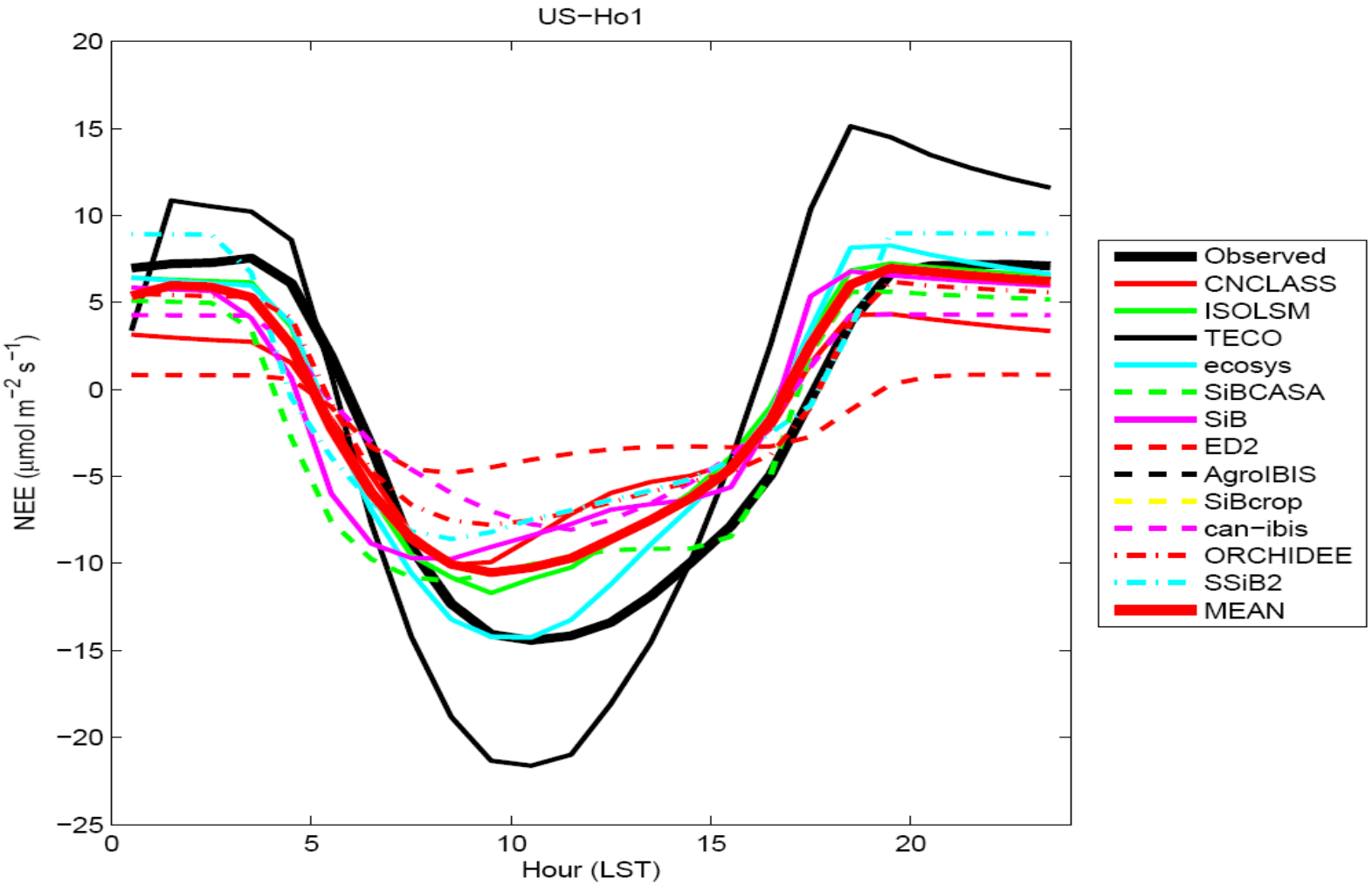
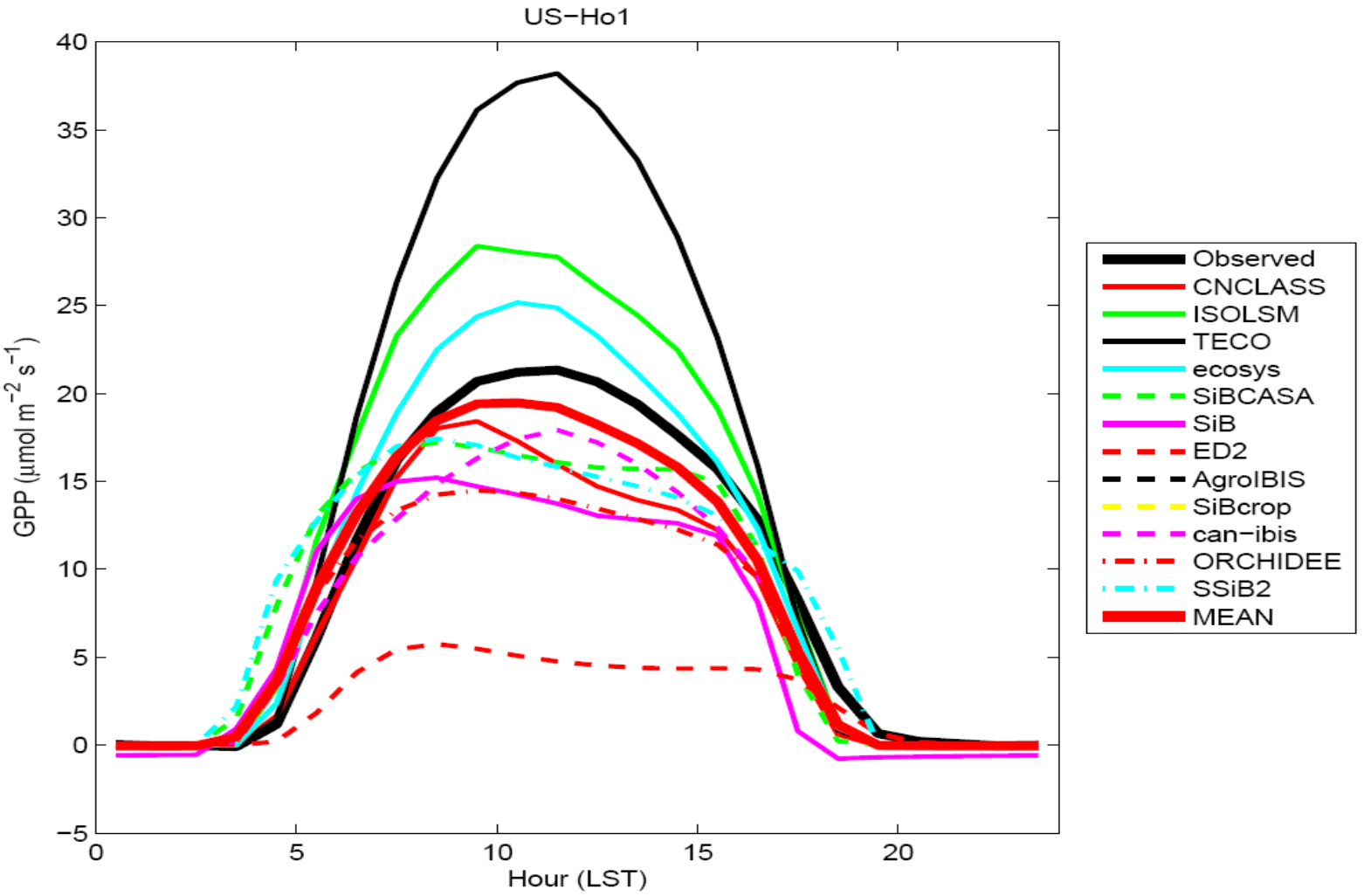


Image credit: Dan Ricciuto

Multi-model comparison: diurnal cycle (Howland growing season mean)



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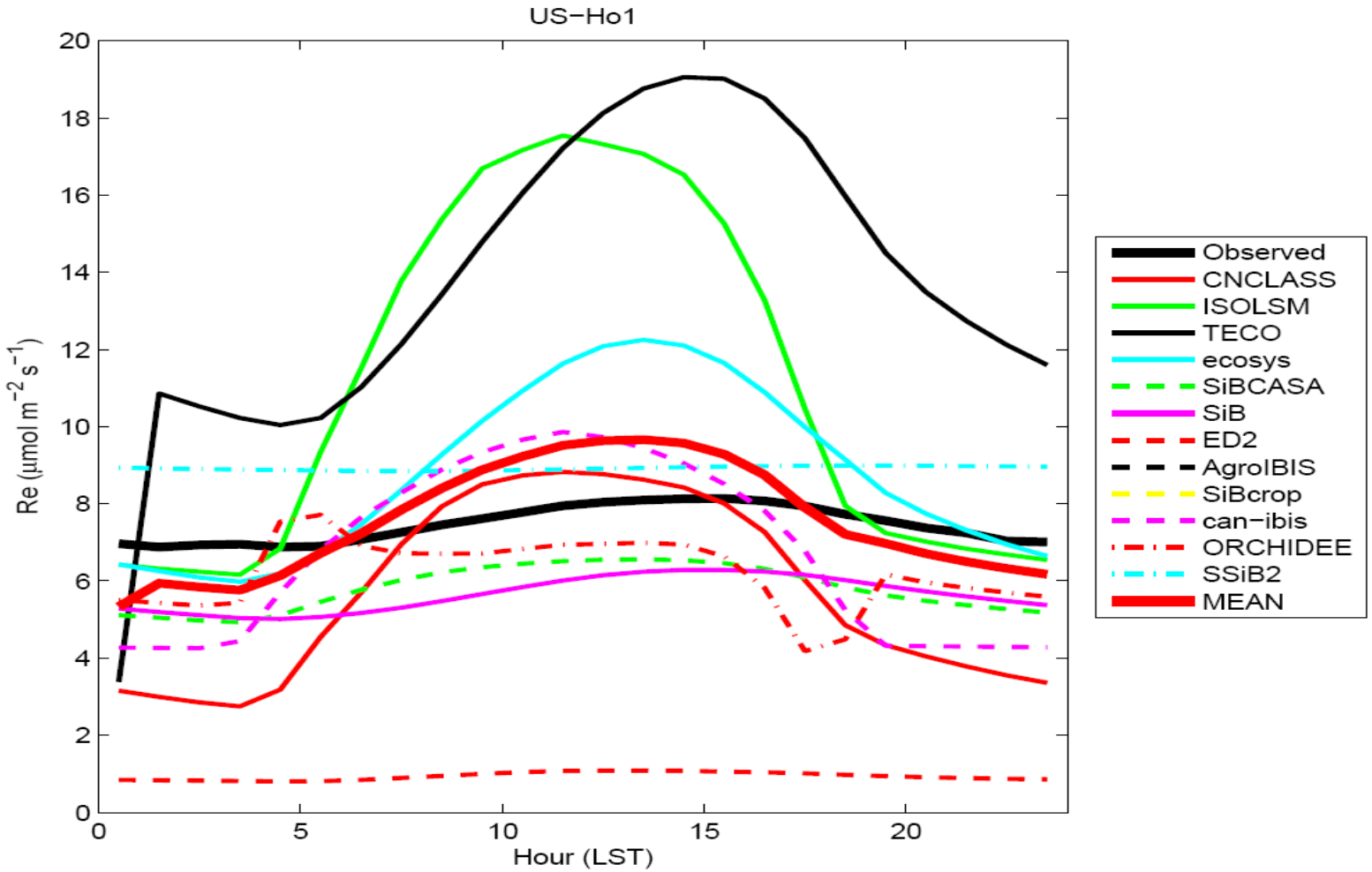
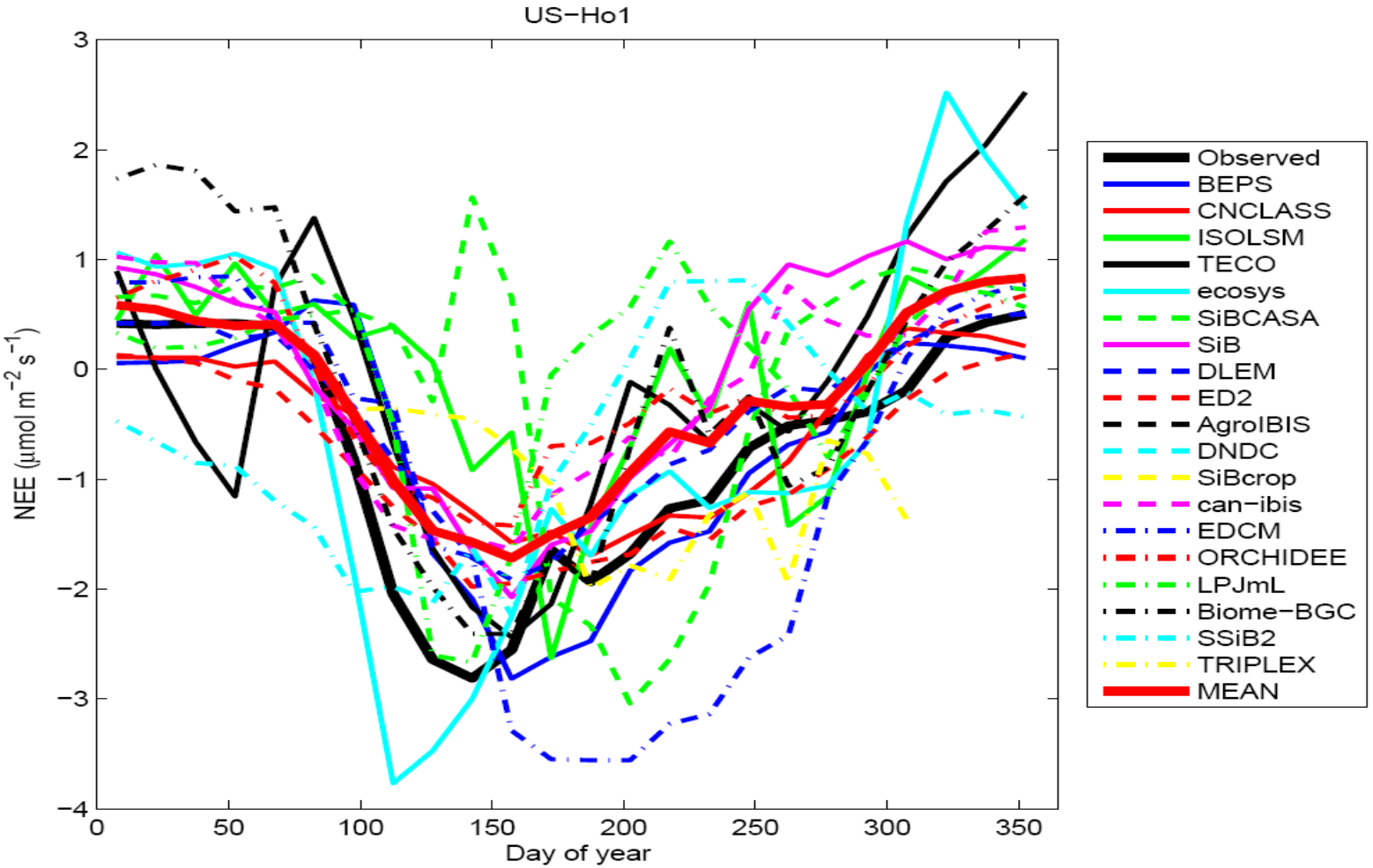


Image credit: Dan Ricciuto

Multi-model comparison: seasonal cycle (Howland, NEE)



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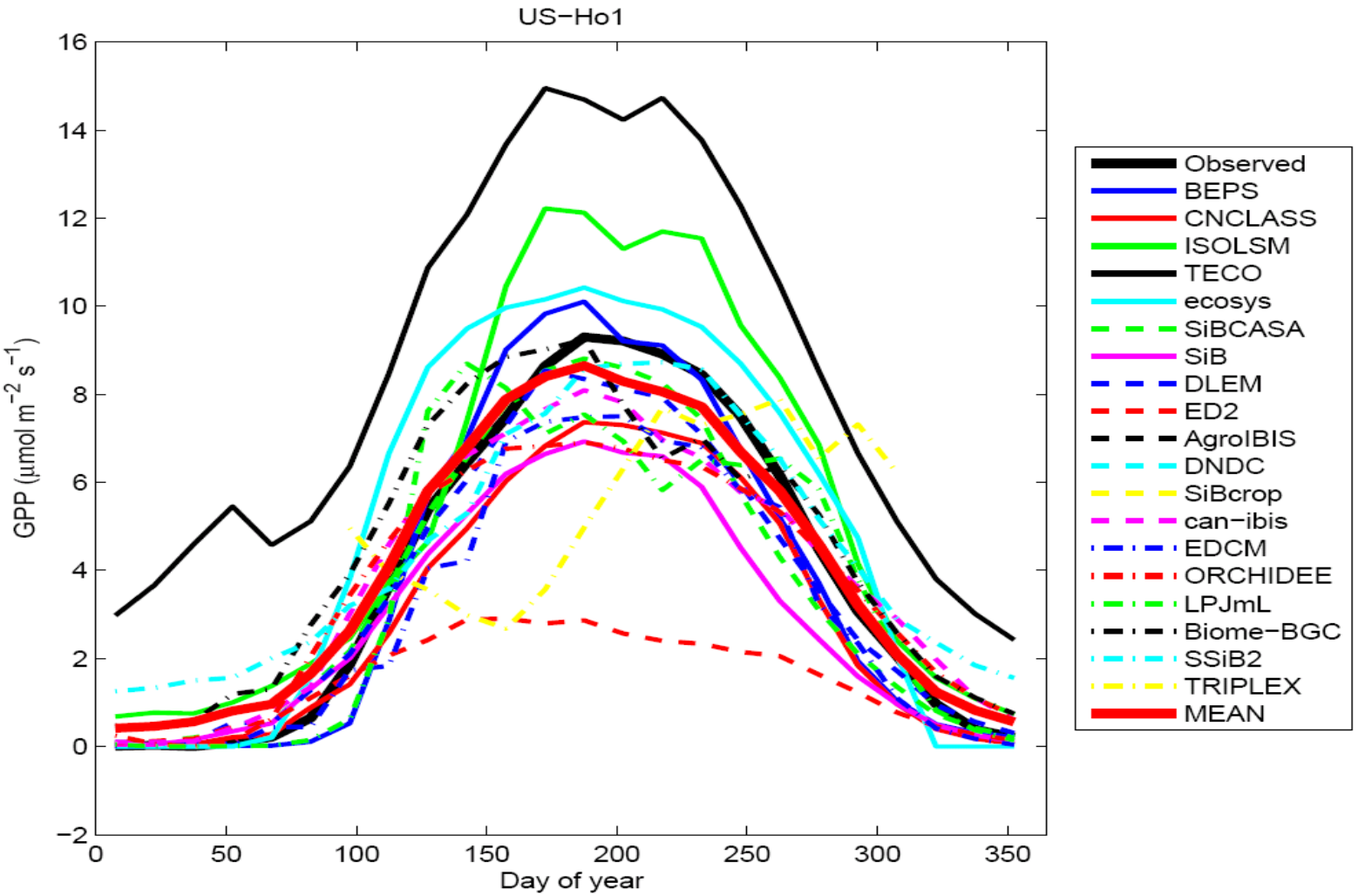
Multi-model comparison: seasonal cycle (Howland, GPP)



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Multi-model comparison: seasonal cycle (Howland, Re)

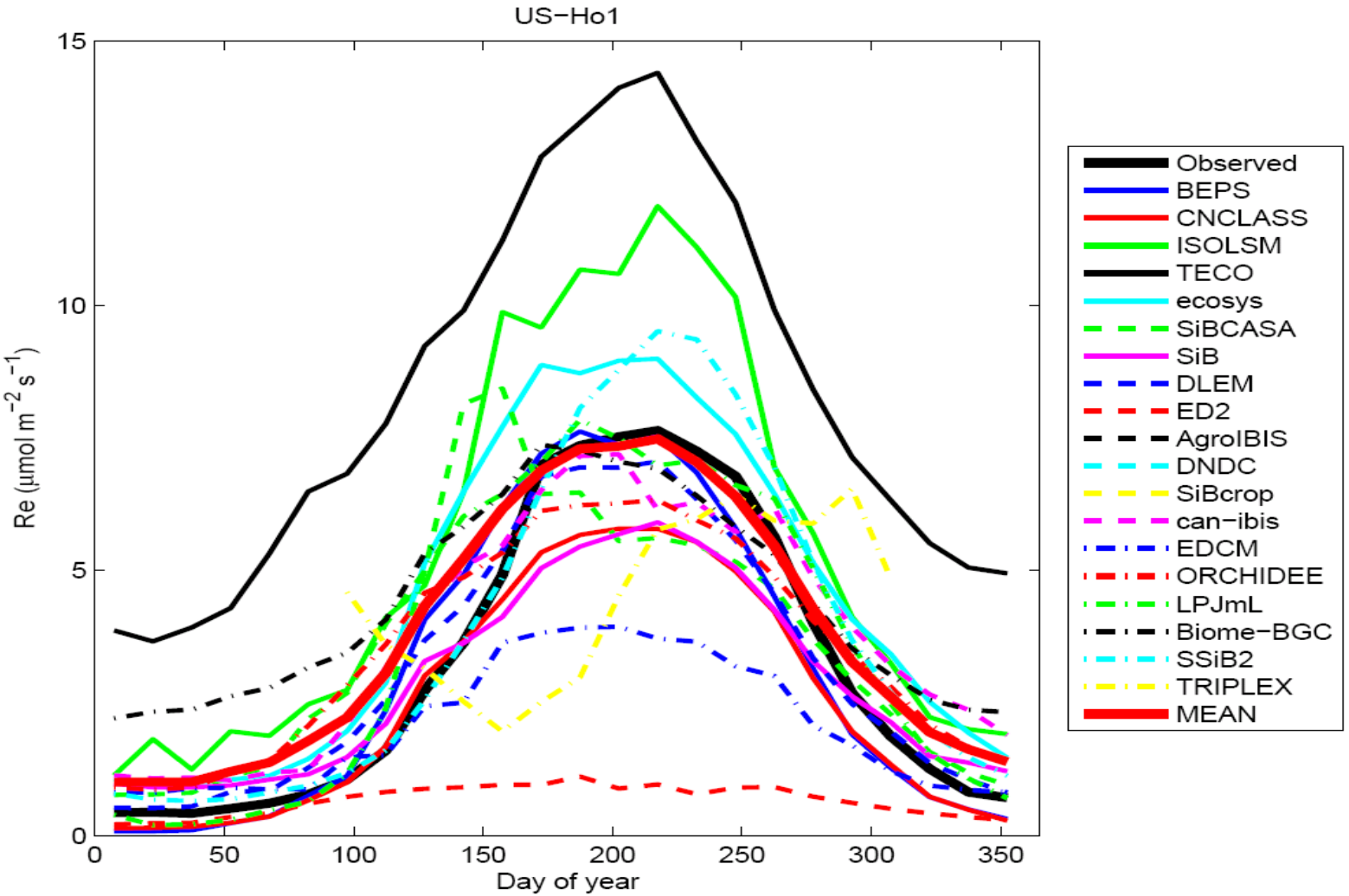
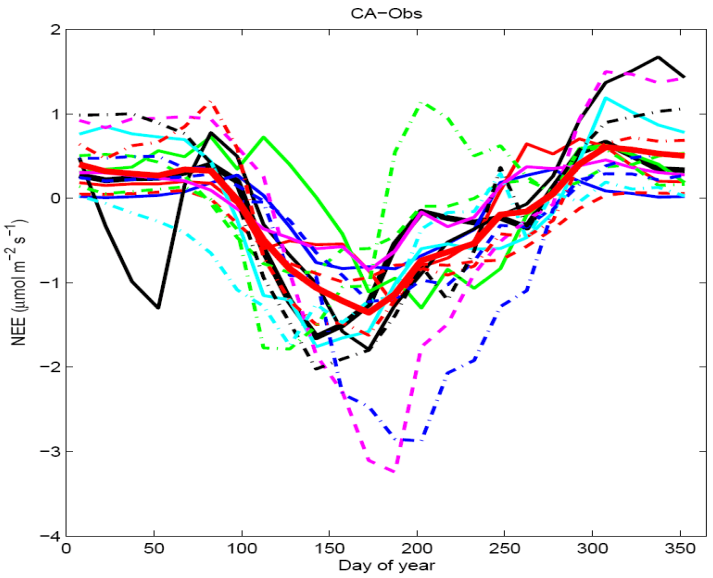
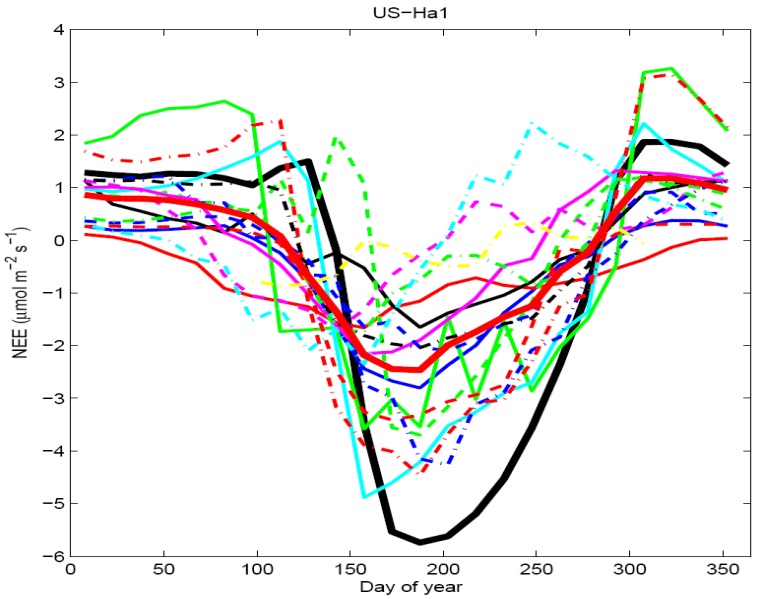
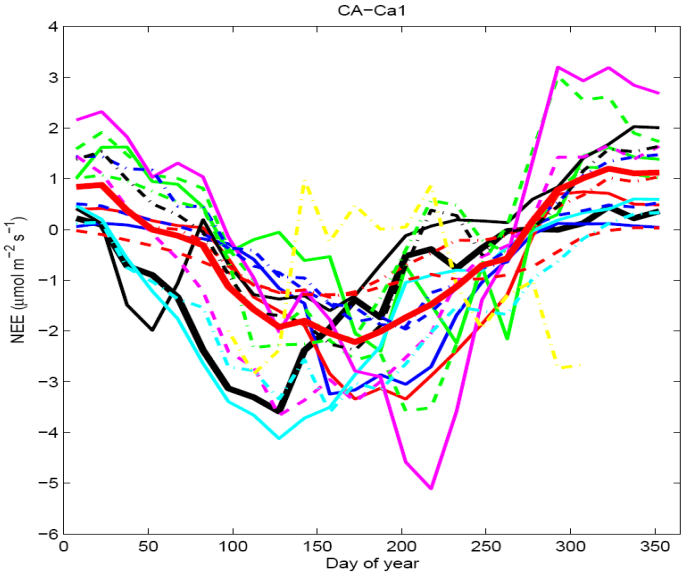


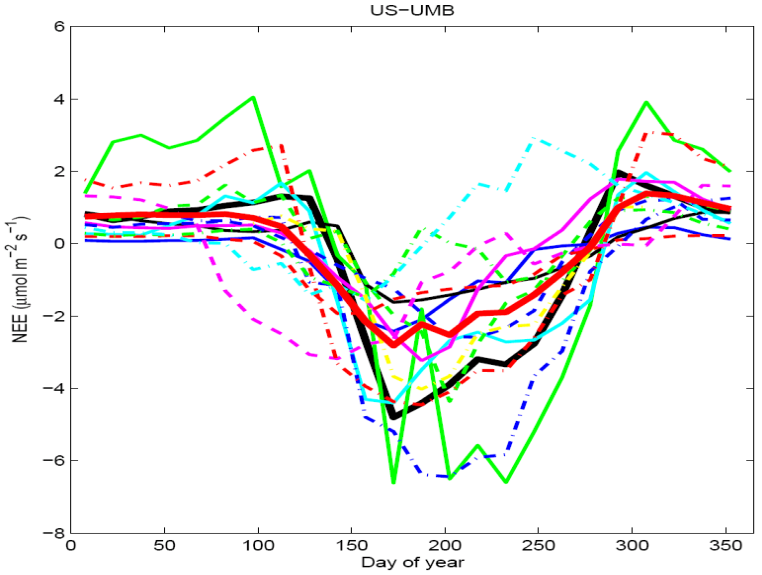
Image credit: Dan Ricciuto

Seasonal cycle NEE, multiple sites

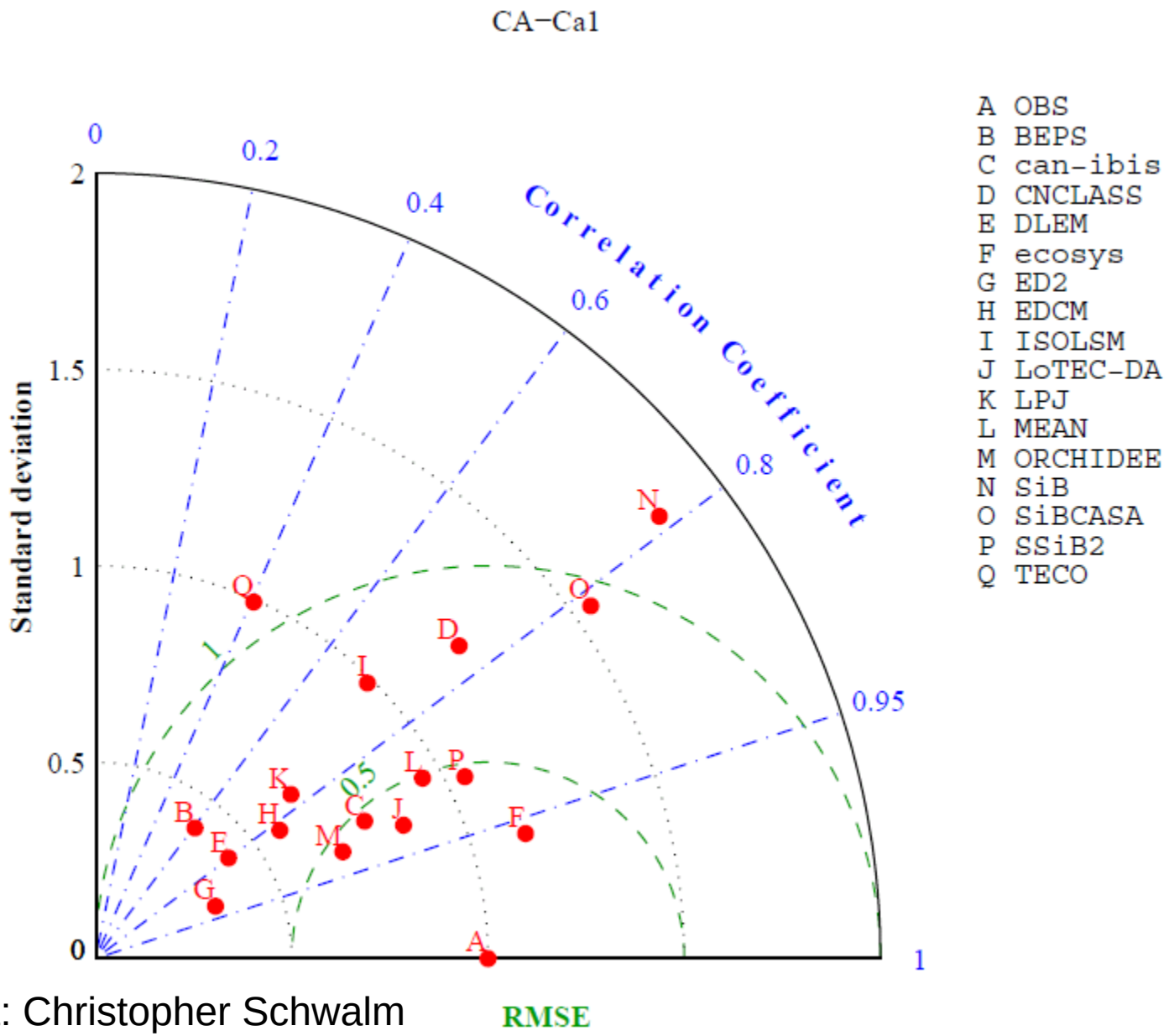








Preliminary analyses: multi-model



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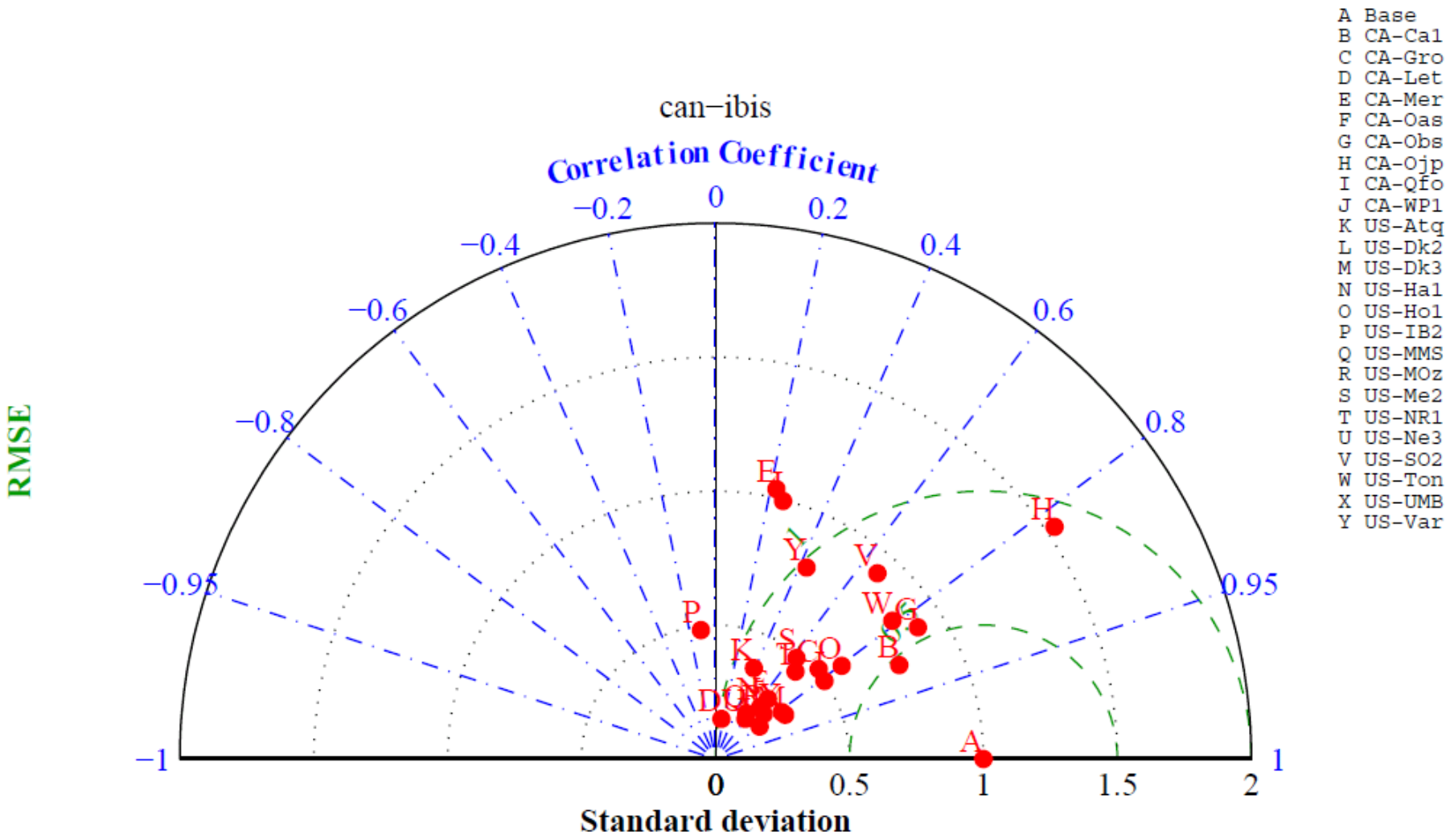
Preliminary analyses: multi-site



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Mean-model, multi-site…

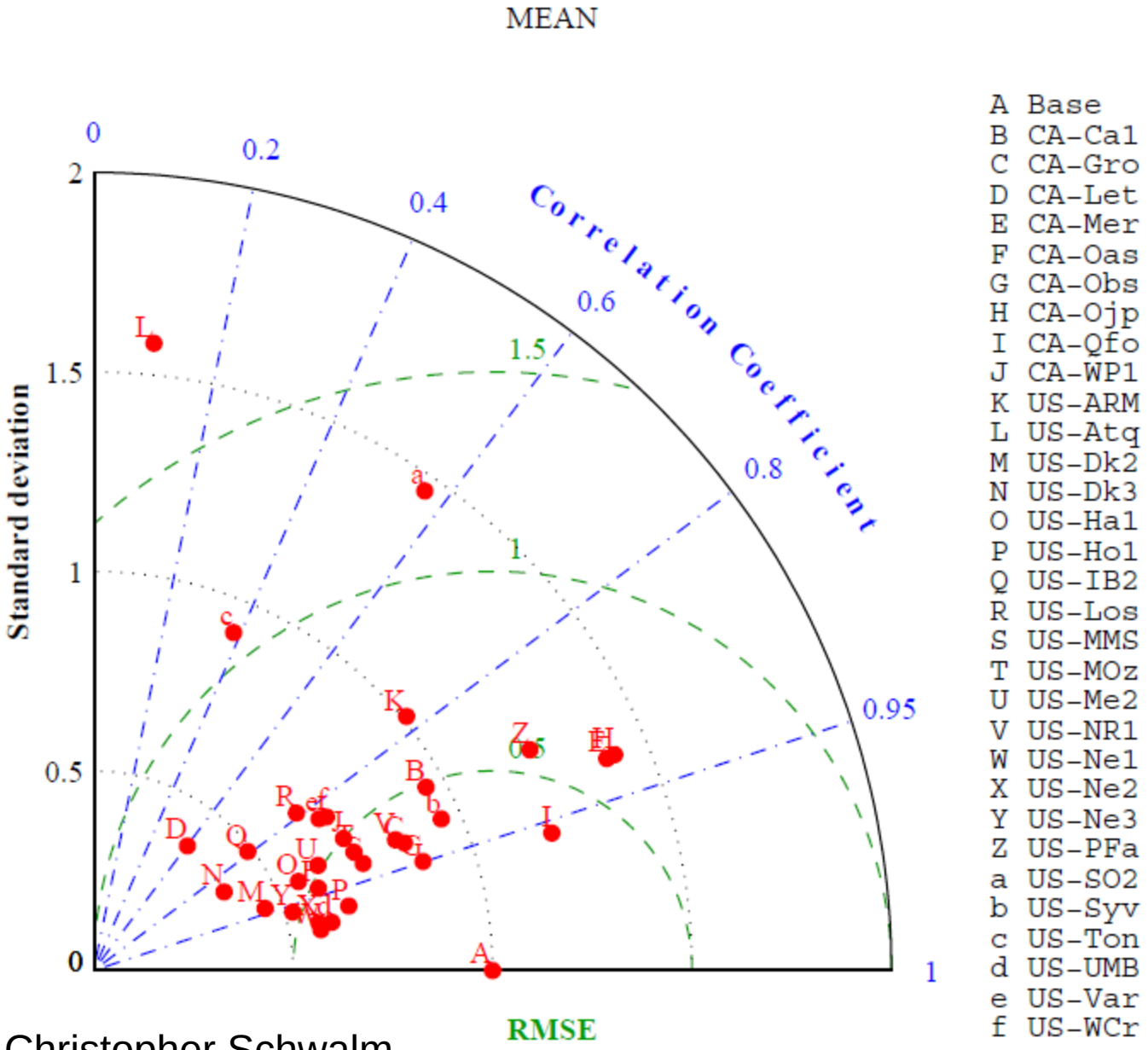

Image credit: Christopher Schwalm

Conclusions

- Now about 75% of the way to first publishable model-data analyses
- Building a valuable data and analysis resource for the broader community
- Highlighting (and fixing!) data and model quality issues along the way
- Better understanding of measurement uncertainty than model uncertainty

Conclusions (cont'd)

- Multi-model ensemble provides a useful way to analyze the structural component of model uncertainty
- Next steps:
  - Publish results of steady-state experiments
  - Introduce disturbance history
  - Characterize model uncertainties
    - Forcing
    - Parameterization
    - Process representation