Evaluation of CLM-Crop at corn and soybean sites

Ming Chen, Tim Griffis

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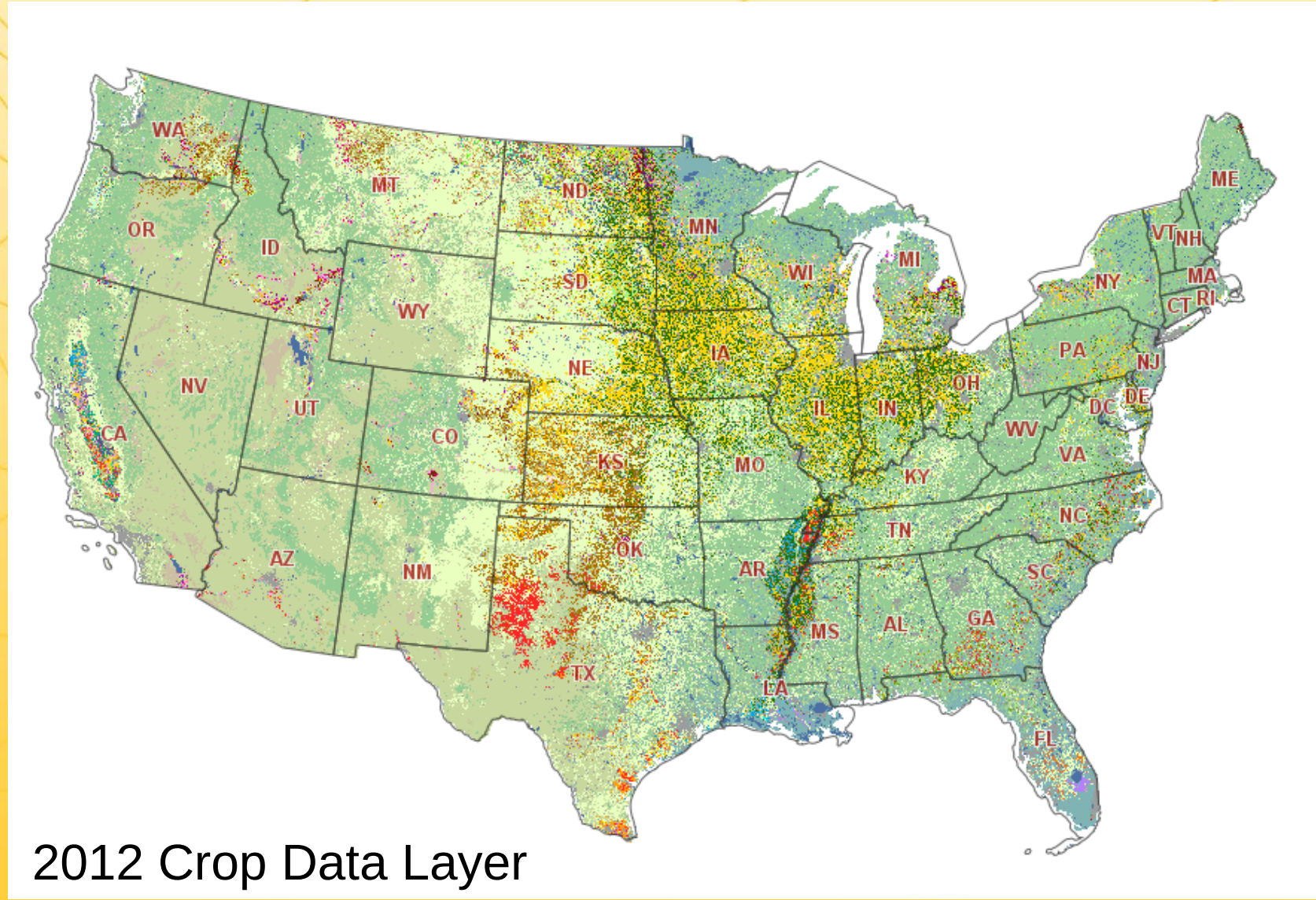
UNIVERSITY OF MINNESOTA

Rationale



2012 Crop Data Layer

Rationale

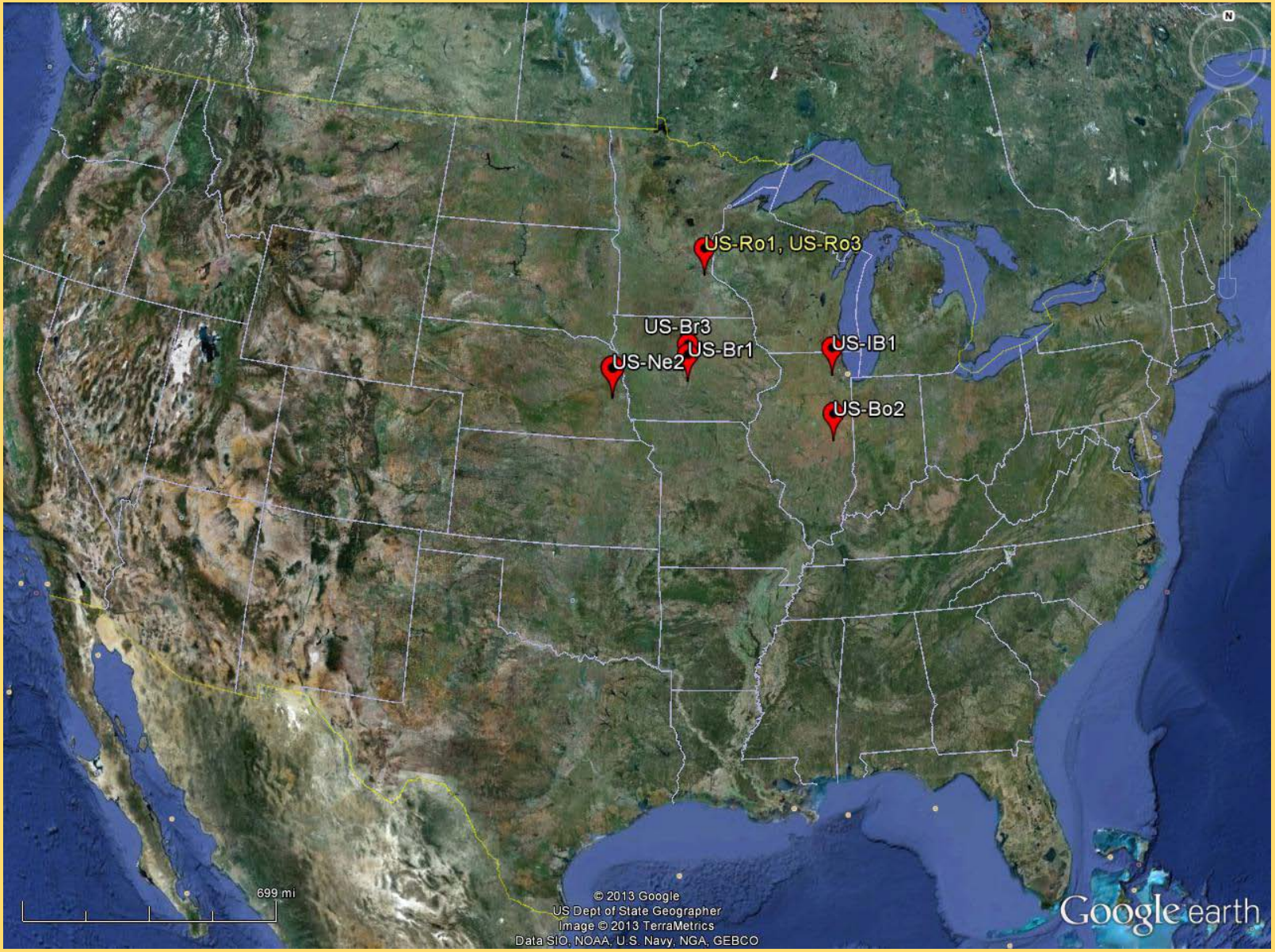
Methods: CLM-crop

- Single crop pft in one grid cell
- Site soil texture data
- Forced by hourly meteorological fields.

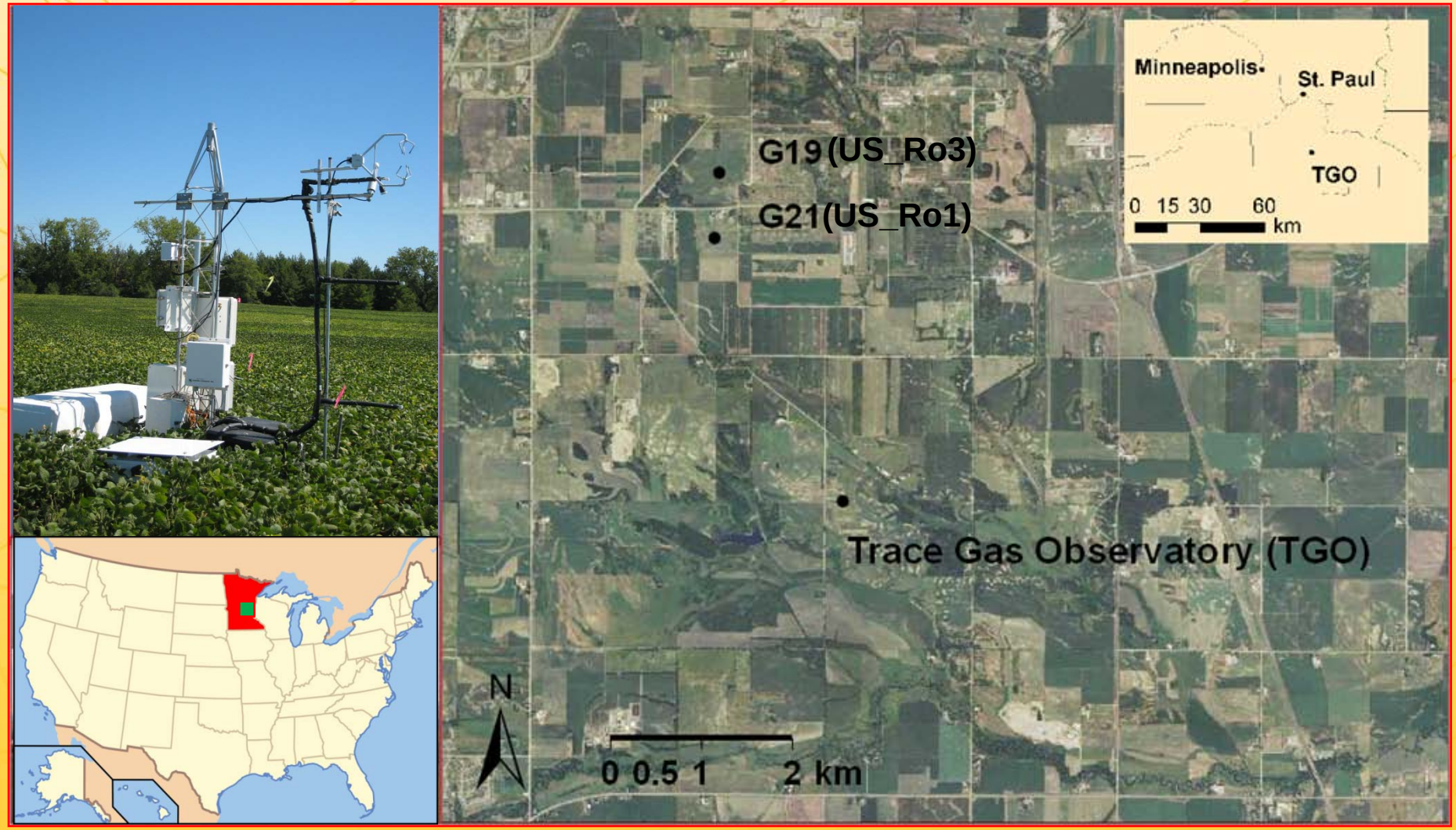
Incoming short radiation	Wind speed
Air pressure	Air temperature
Air humidity	Precipitation

- Simulation is carried out for each year from 2007 to 2010 at two Ameriflux sites (US-Ro1 & US-Ro3).

Methods: observation site

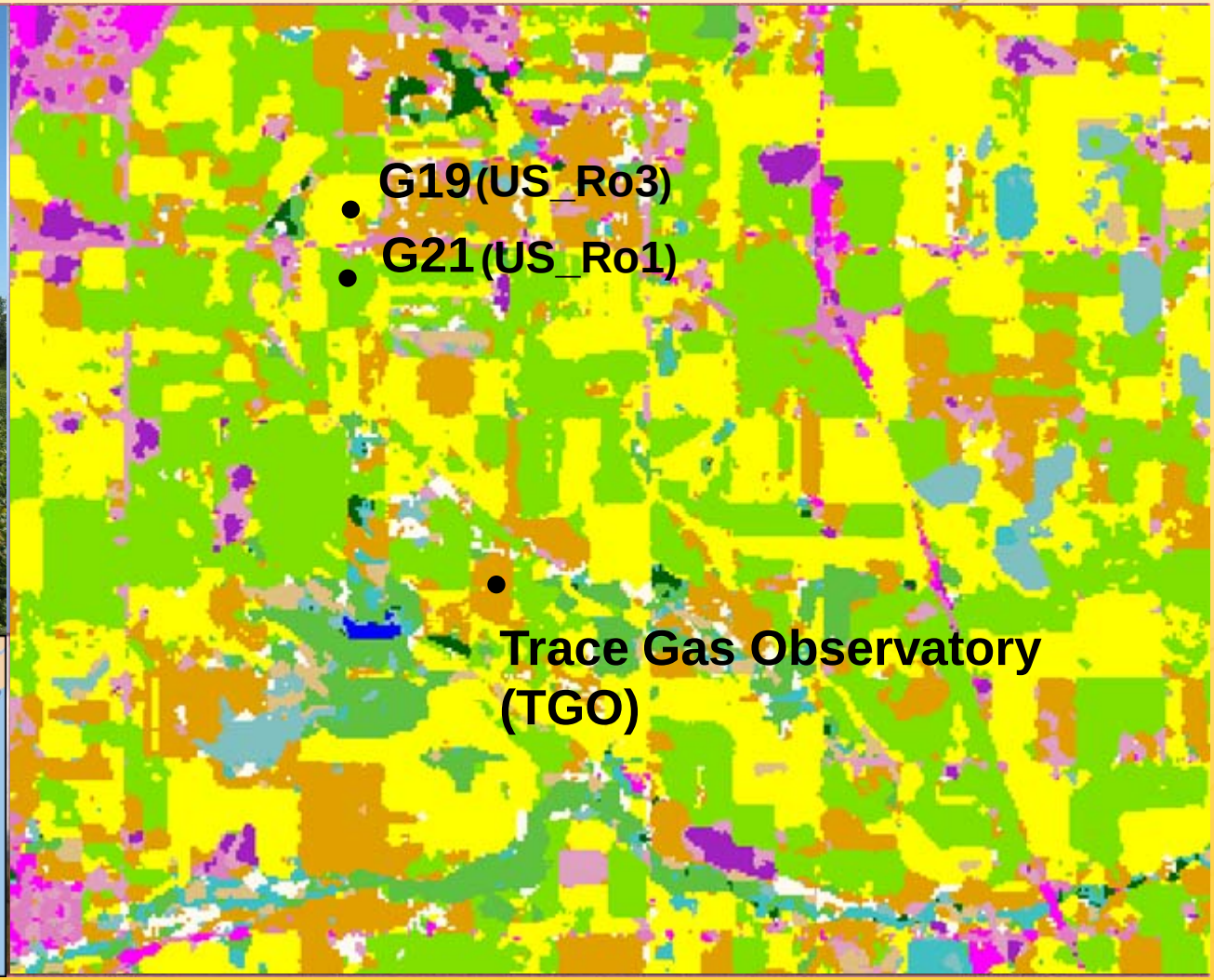


Methods: observation site



Rosemount Research Site

Methods: observation site

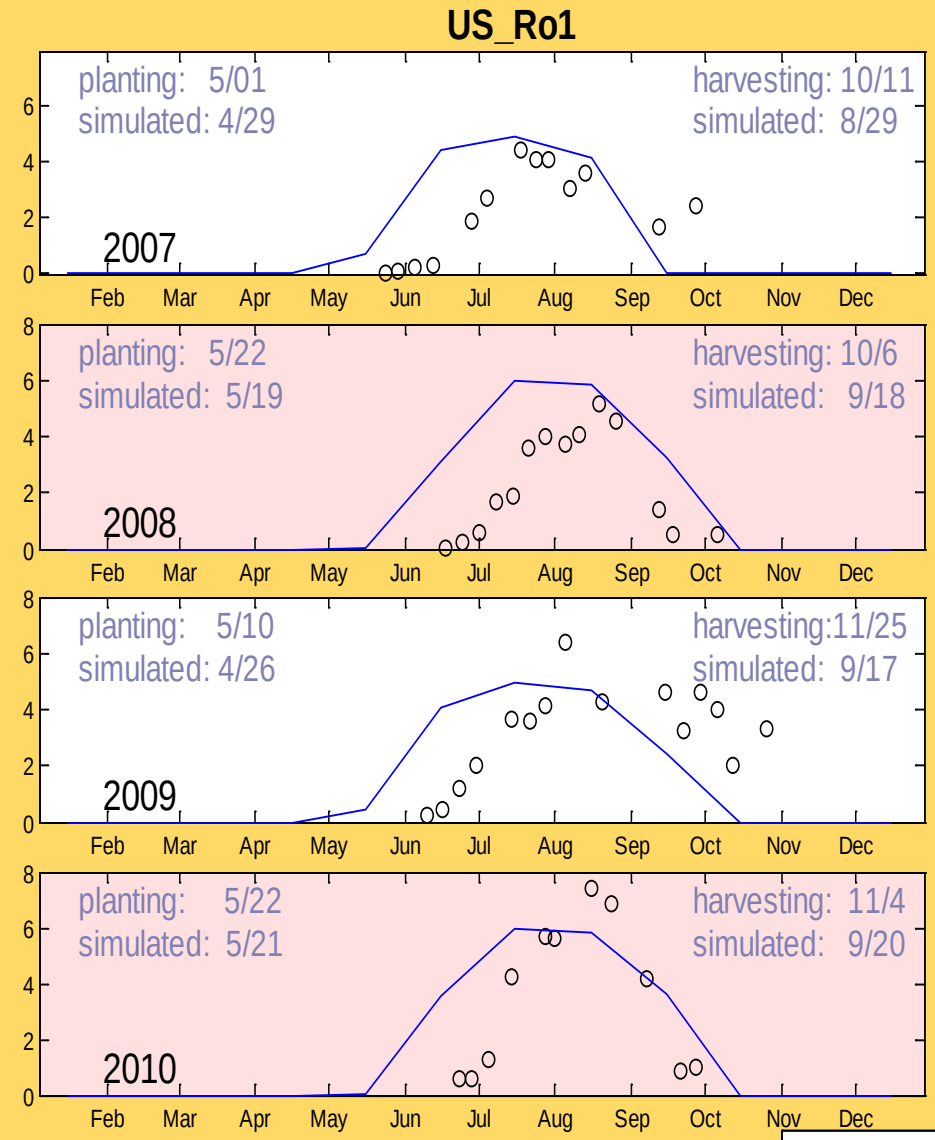


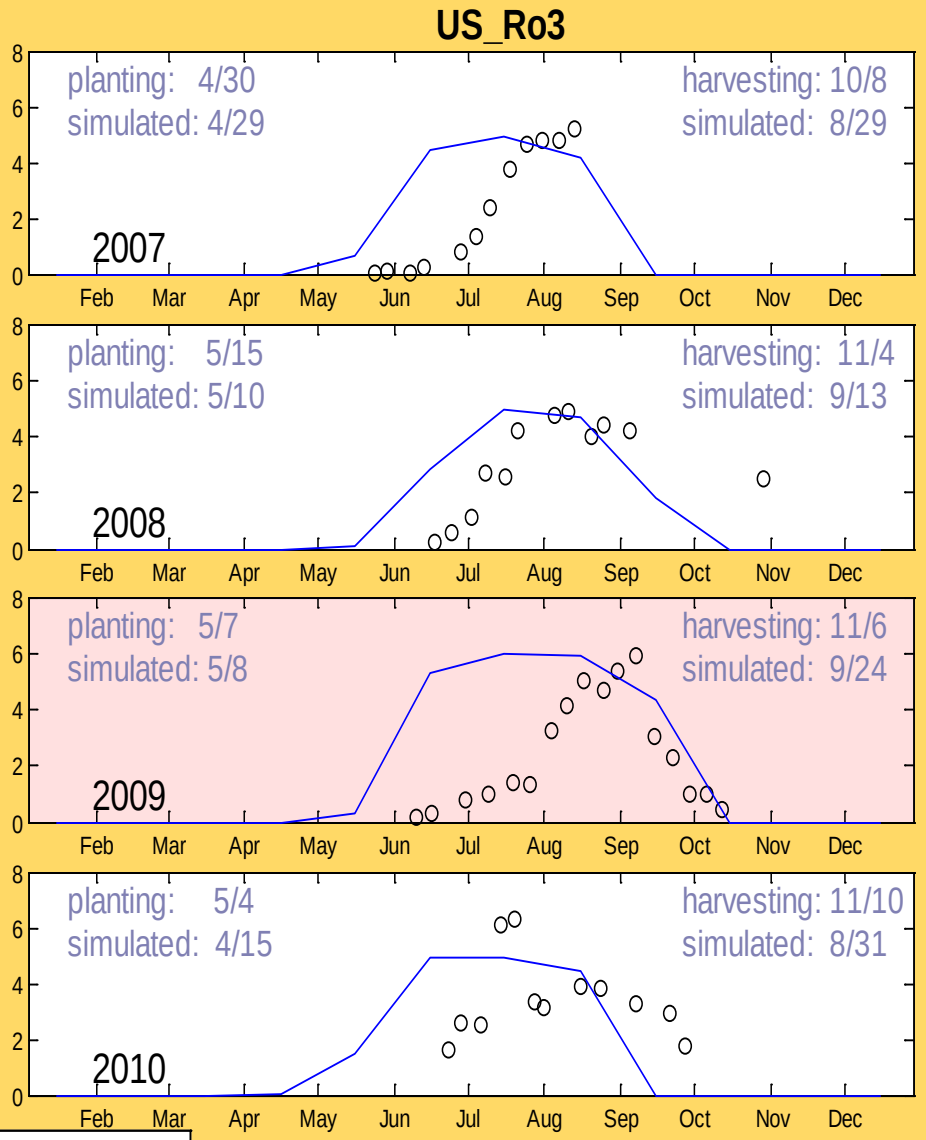
Rosemount Research Site

Methods: observation data

- Hourly meteorology data
- Surface data
  - Crop type
  - Soil texture
  - LAI
  - Crop management
- Energy fluxes data
  - Rn, G
  - H & LE heat fluxes (EC with forced energy closure)
- NEE (- NEP)

Phenology

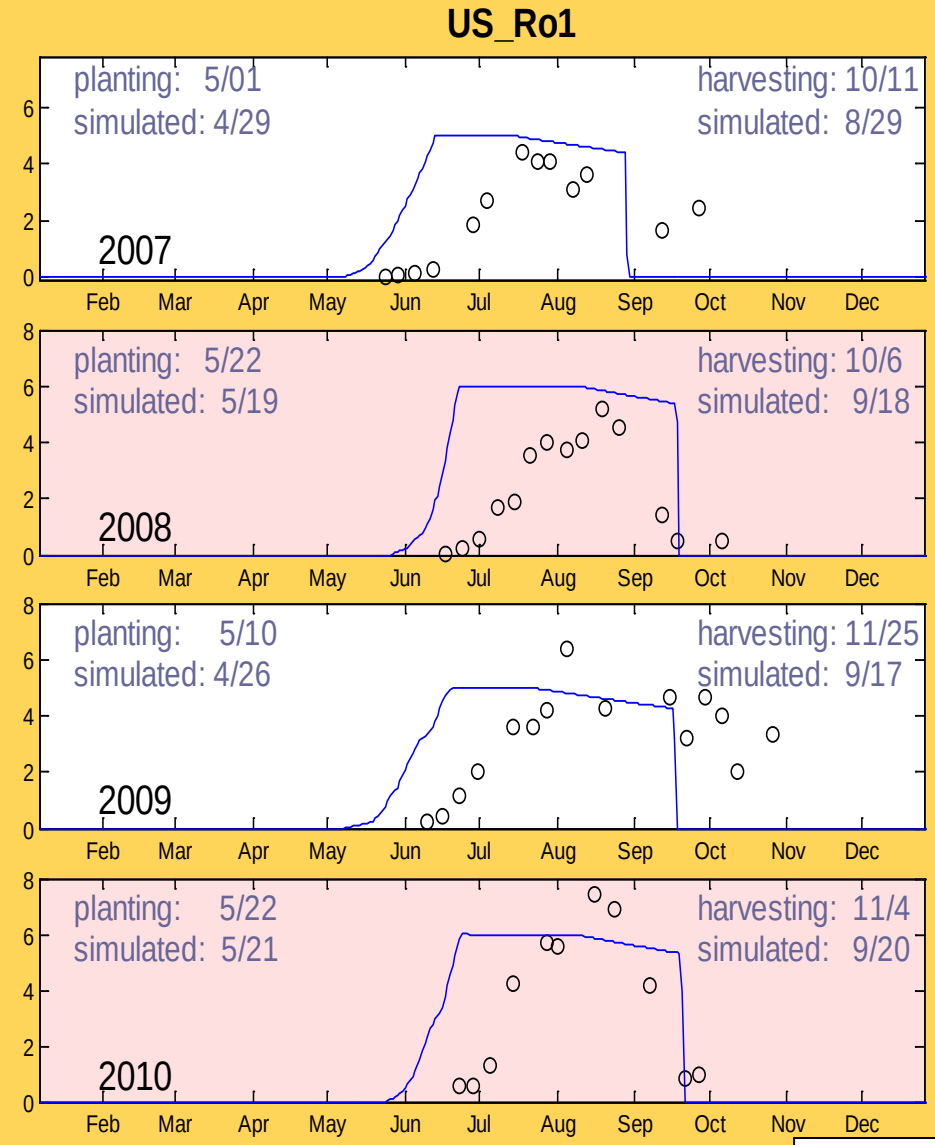


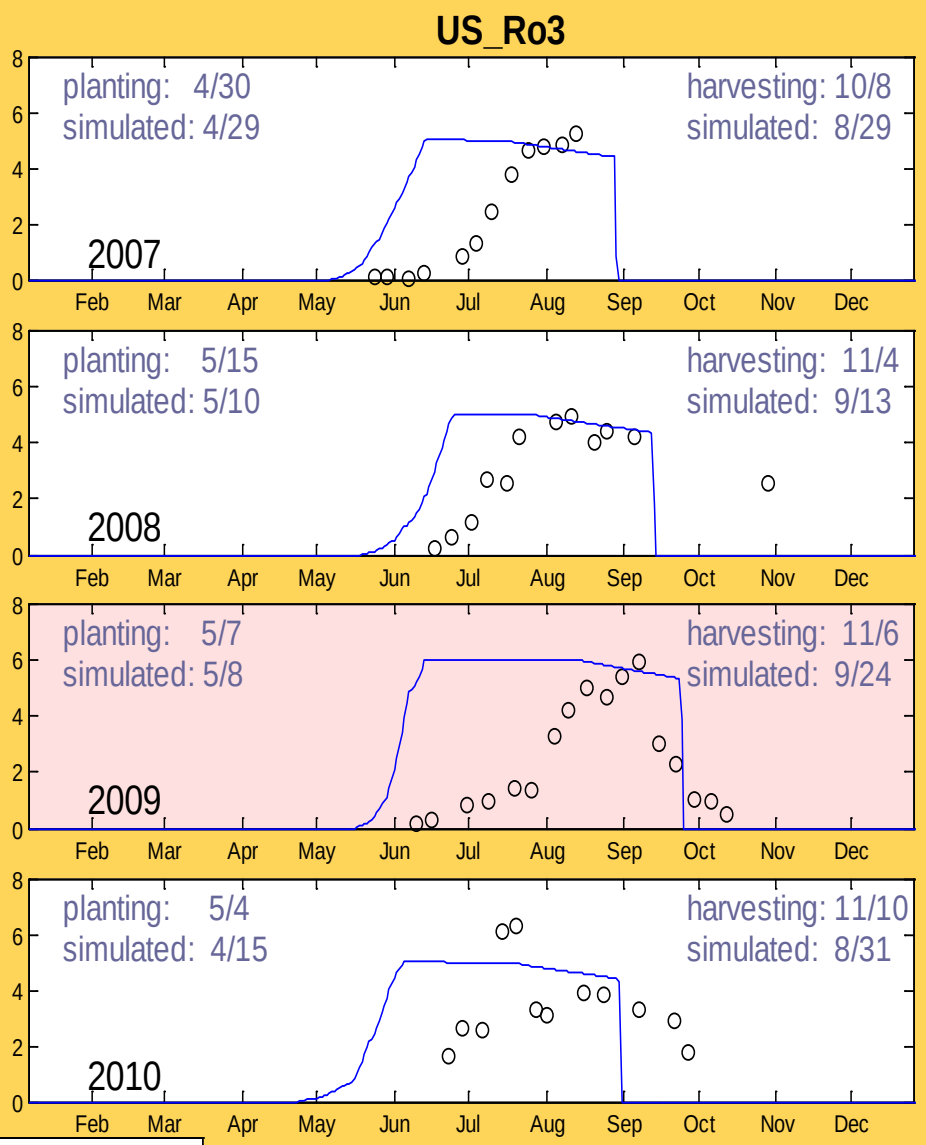


obs — CLMCN_Crop

Phenology

Vmax

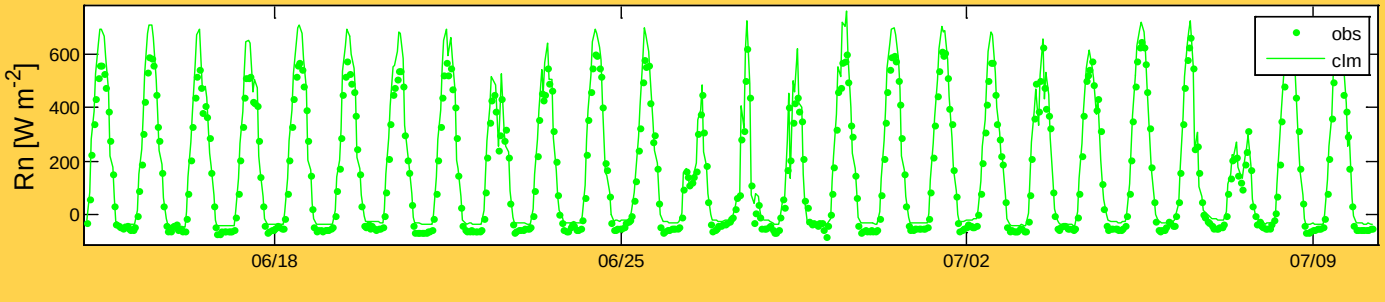


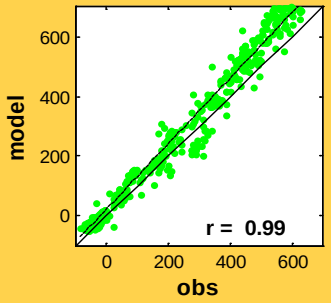


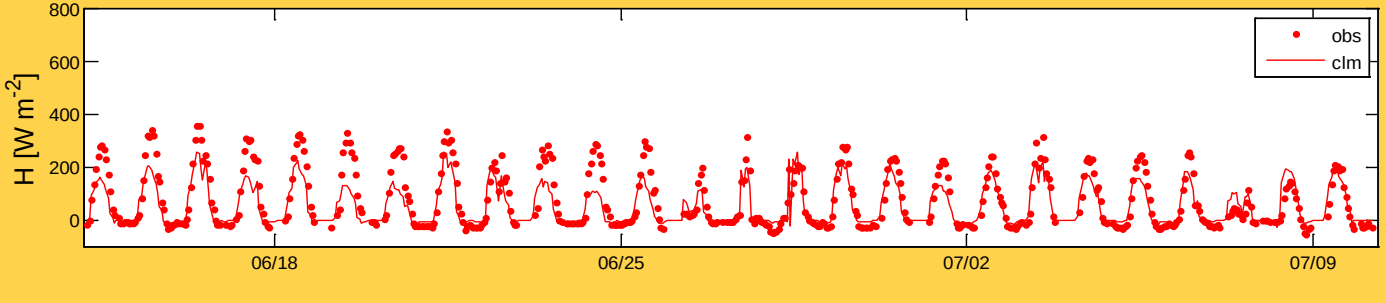
obs — CLMCN_Crop

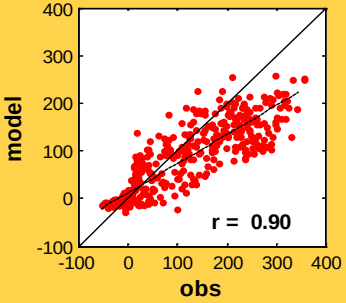
Energy

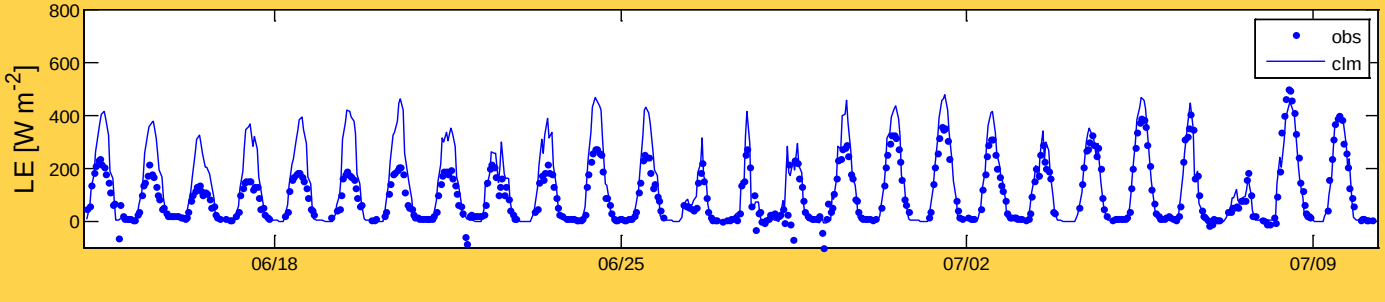
Corn, 2008

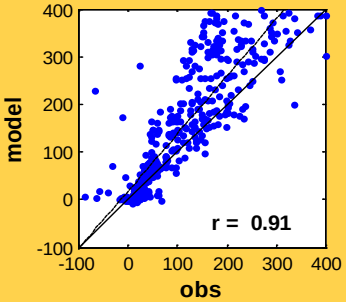


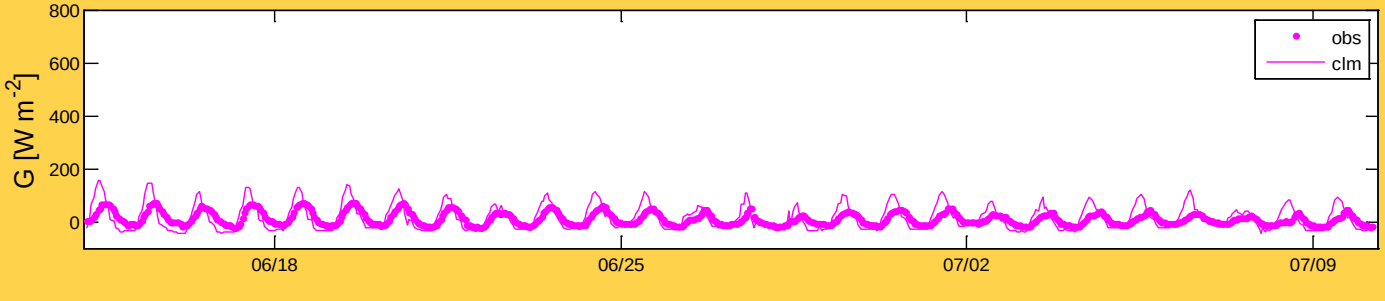


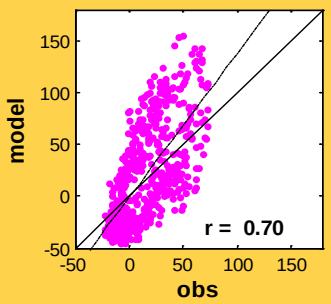




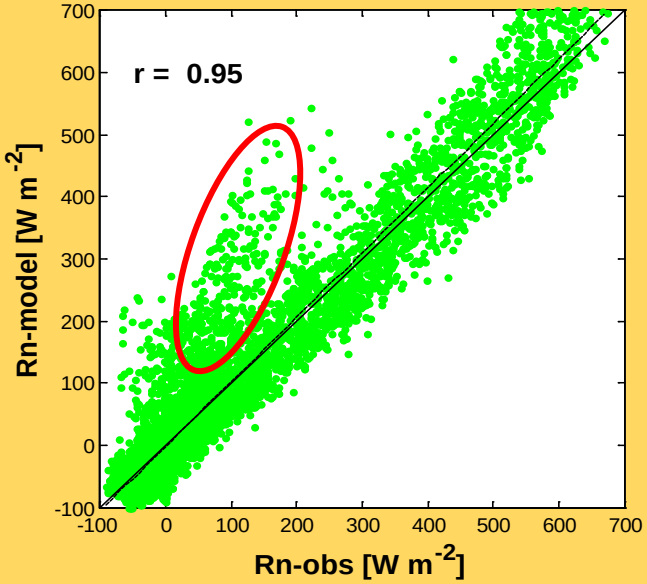


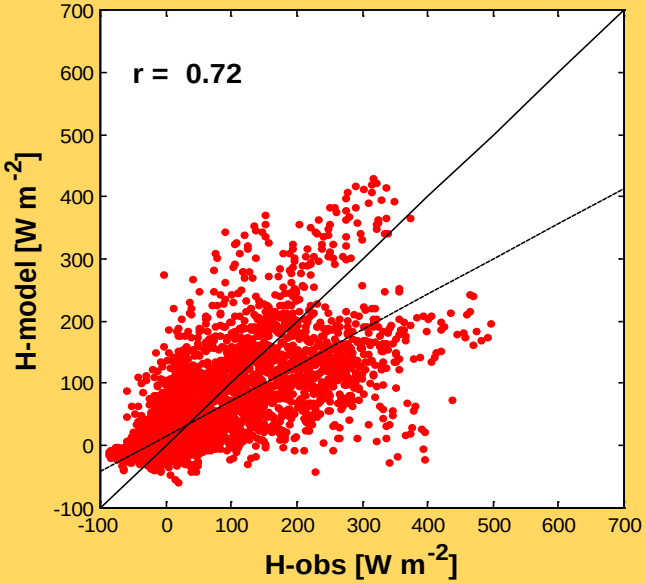


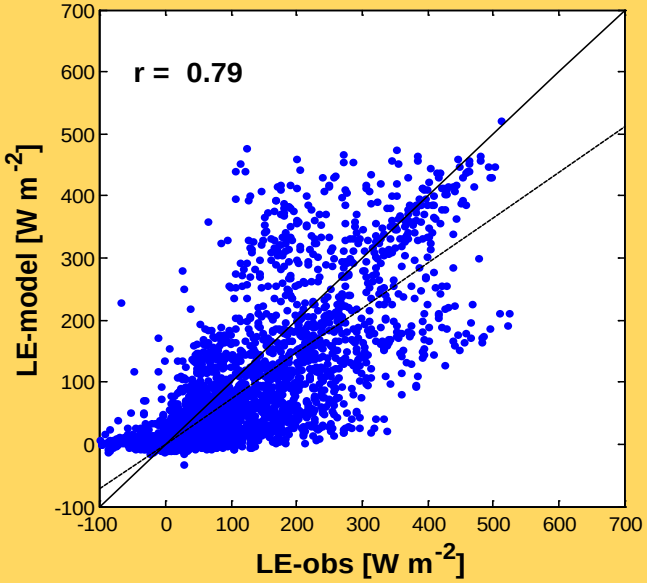


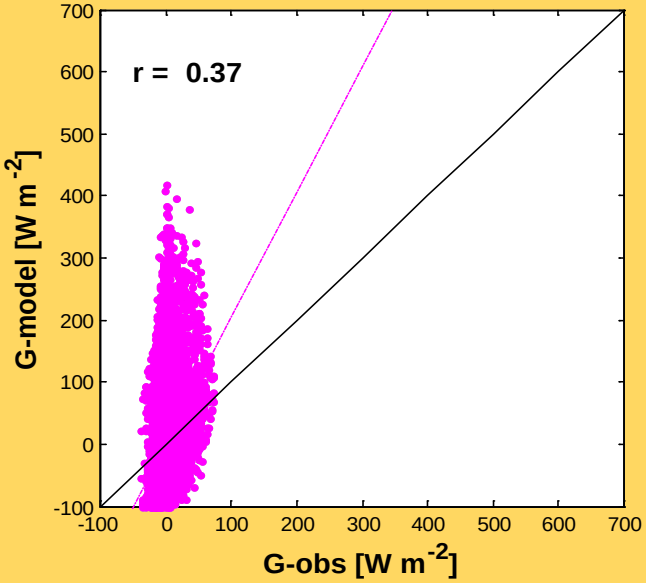


Energy

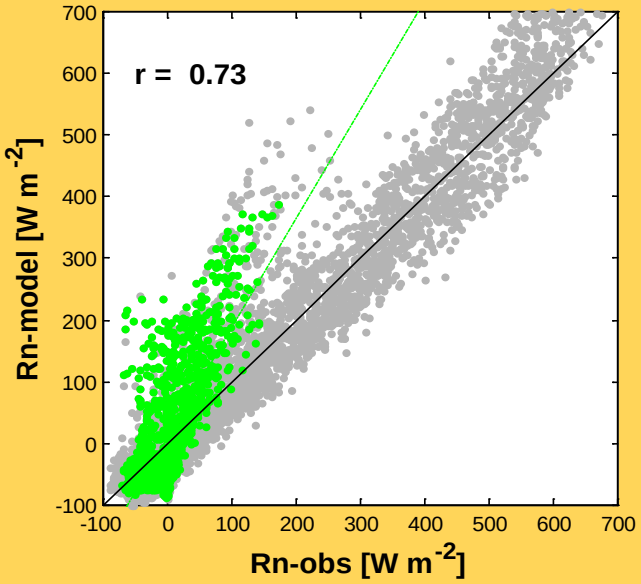

r = 0.95
Rn-model [W m-2]
Rn-obs [W m-2]
700
600
500
400
300
200
100
0
-100
-100 0 100 200 300 400 500 600 700


r = 0.72
H-model [W m-2]
H-obs [W m-2]
700
600
500
400
300
200
100
0
-100
-100 0 100 200 300 400 500 600 700


r = 0.79
LE-model [W m-2]
LE-obs [W m-2]
700
600
500
400
300
200
100
0
-100
-100 0 100 200 300 400 500 600 700

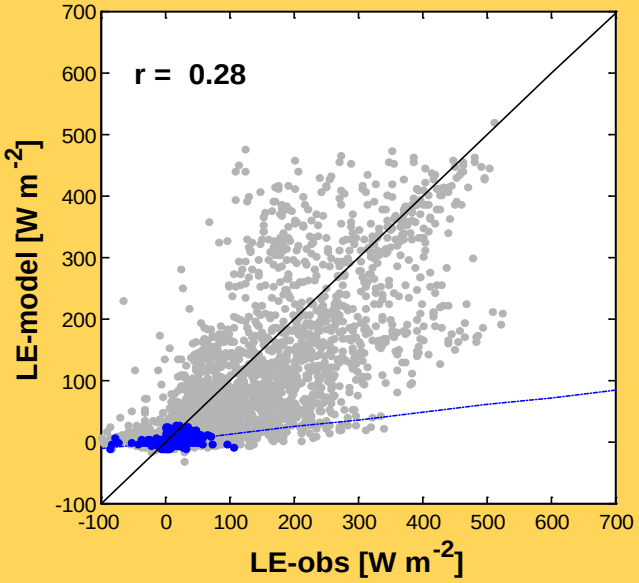

r = 0.37
G-model [W m-2]
G-obs [W m-2]
700
600
500
400
300
200
100
0
-100
-100 0 100 200 300 400 500 600 700

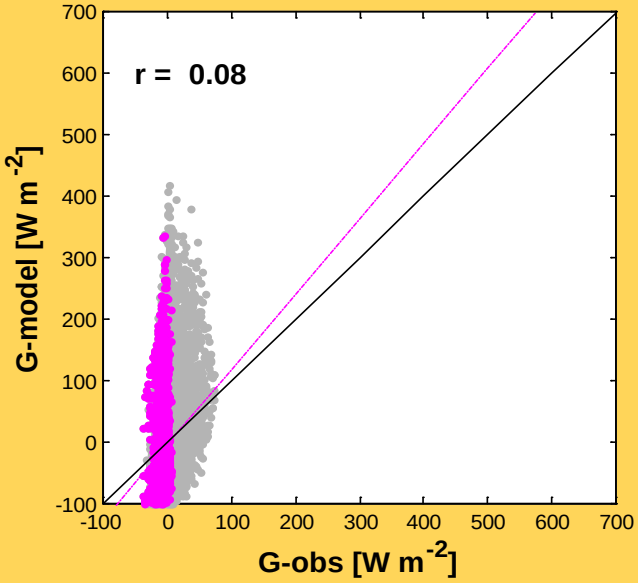
Energy: snow-covering time



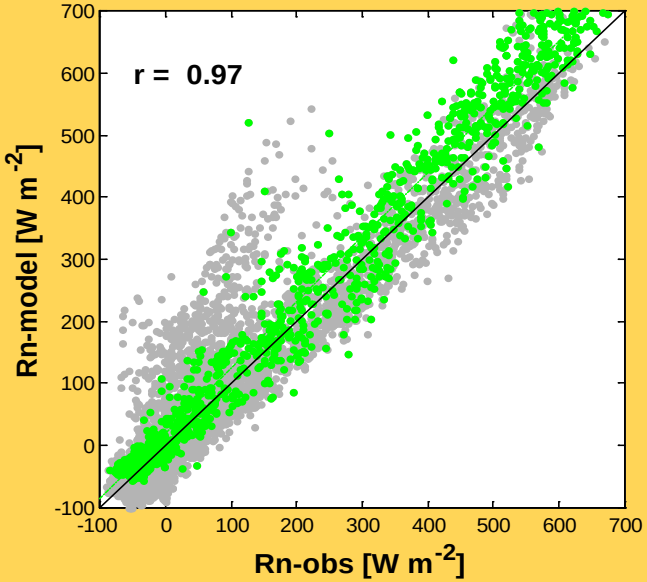
$$A = A^{*}(1 - f_{veg}^{sno})$$

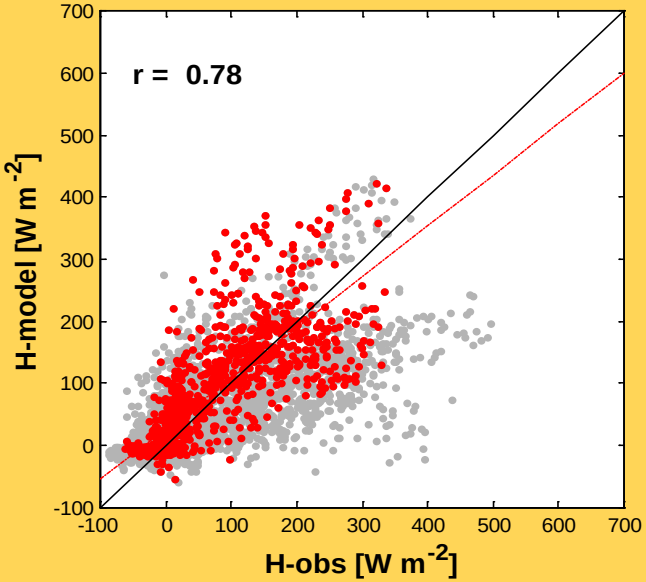
$$f_{veg}^{sno} = \frac{\min(0.2, z_{sno})}{0.2}$$

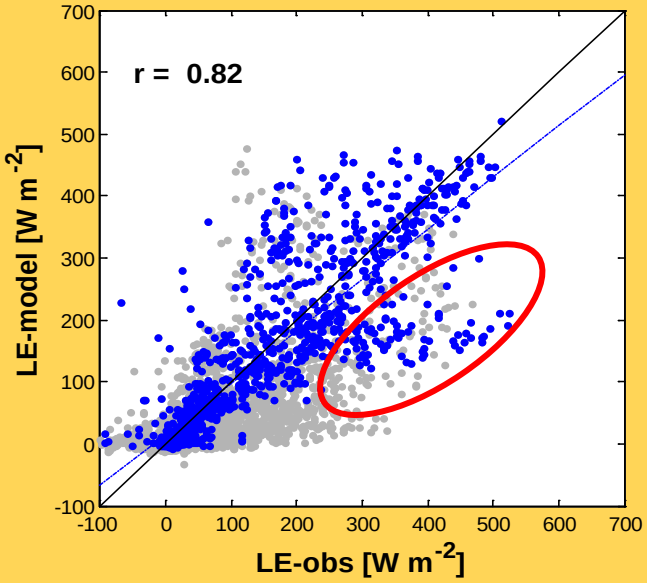


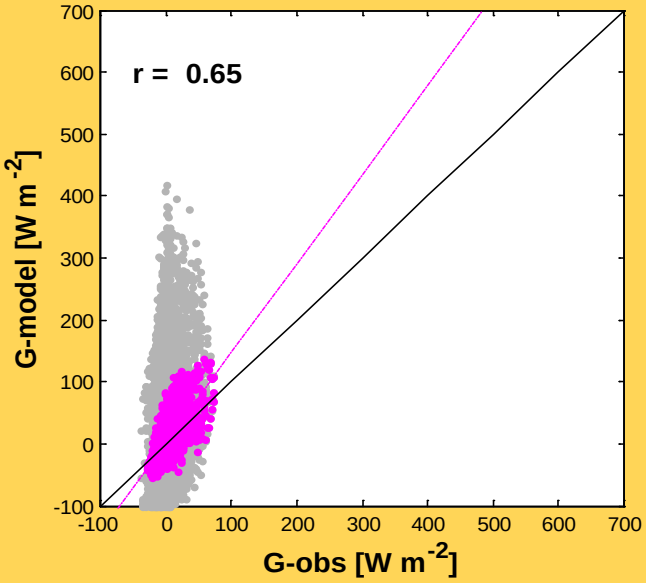


Energy: growing season

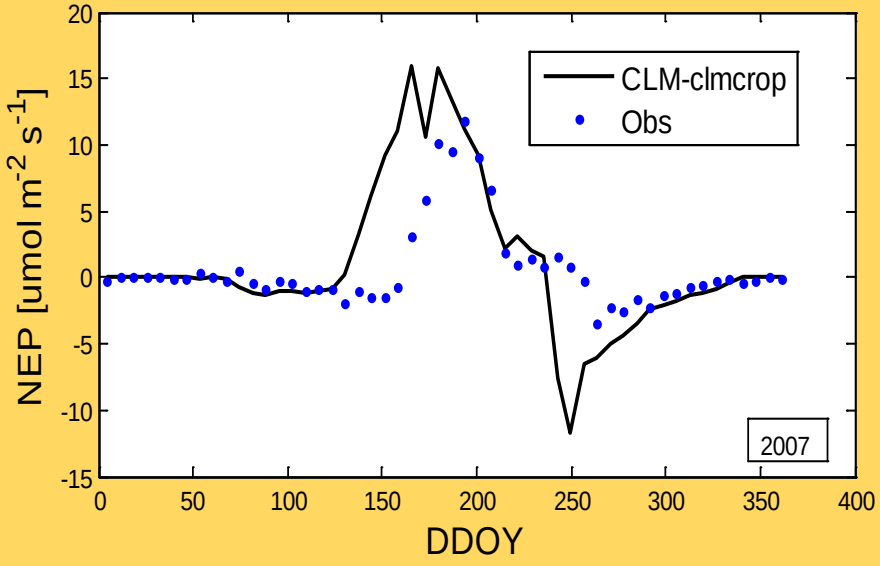


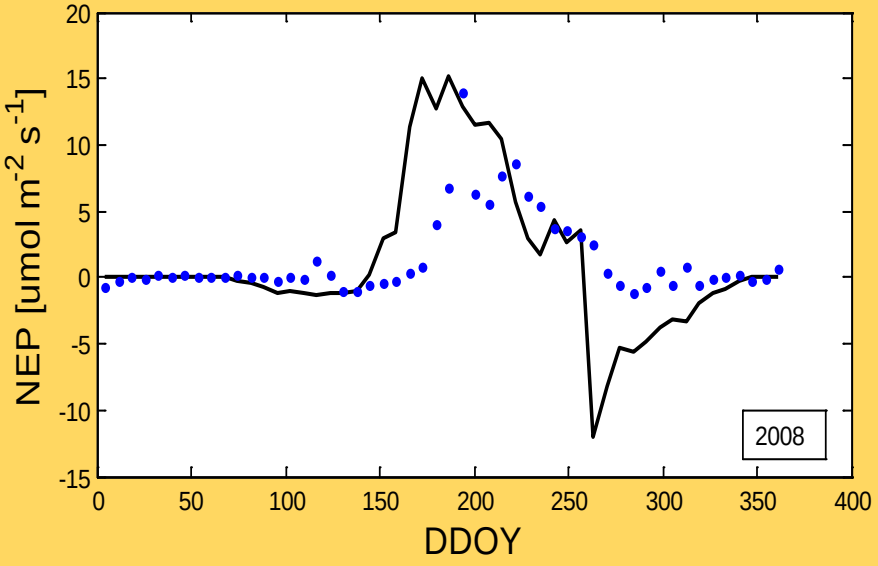


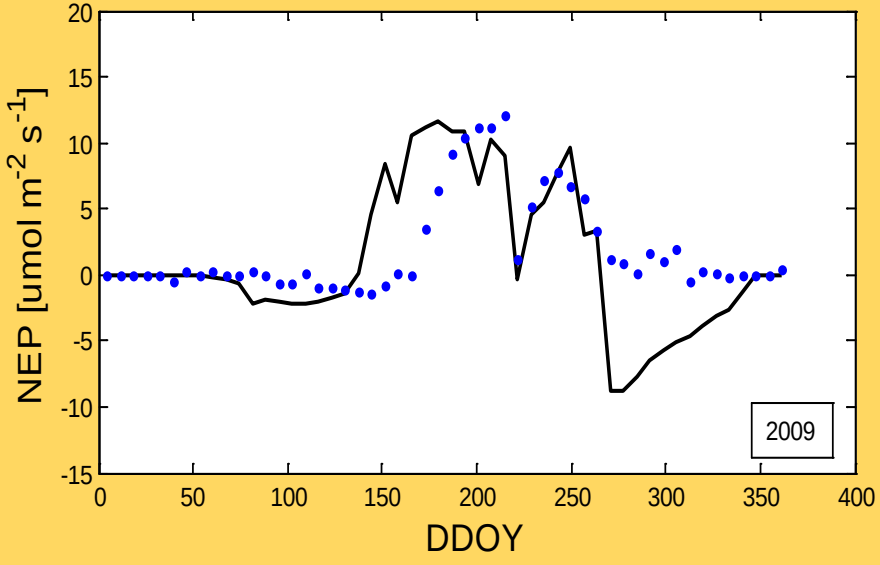


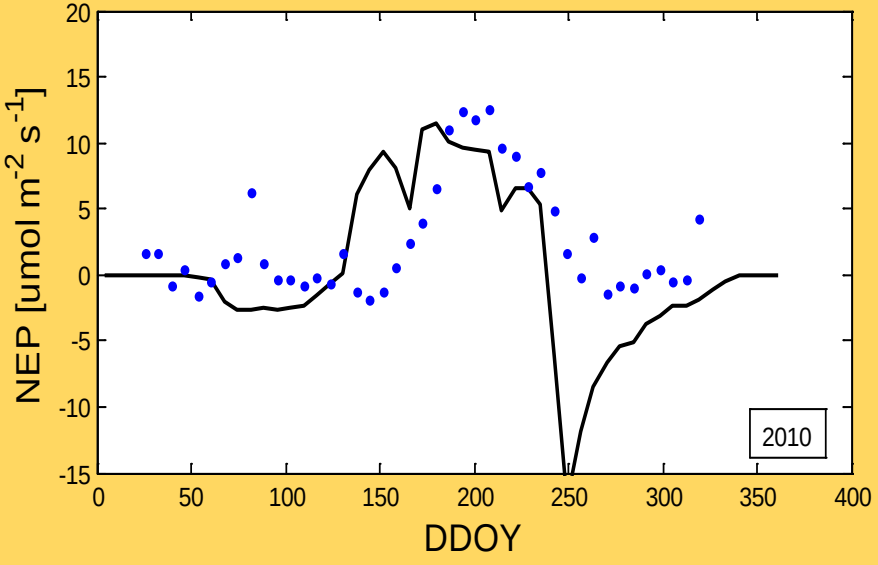


Net Ecosystem Production









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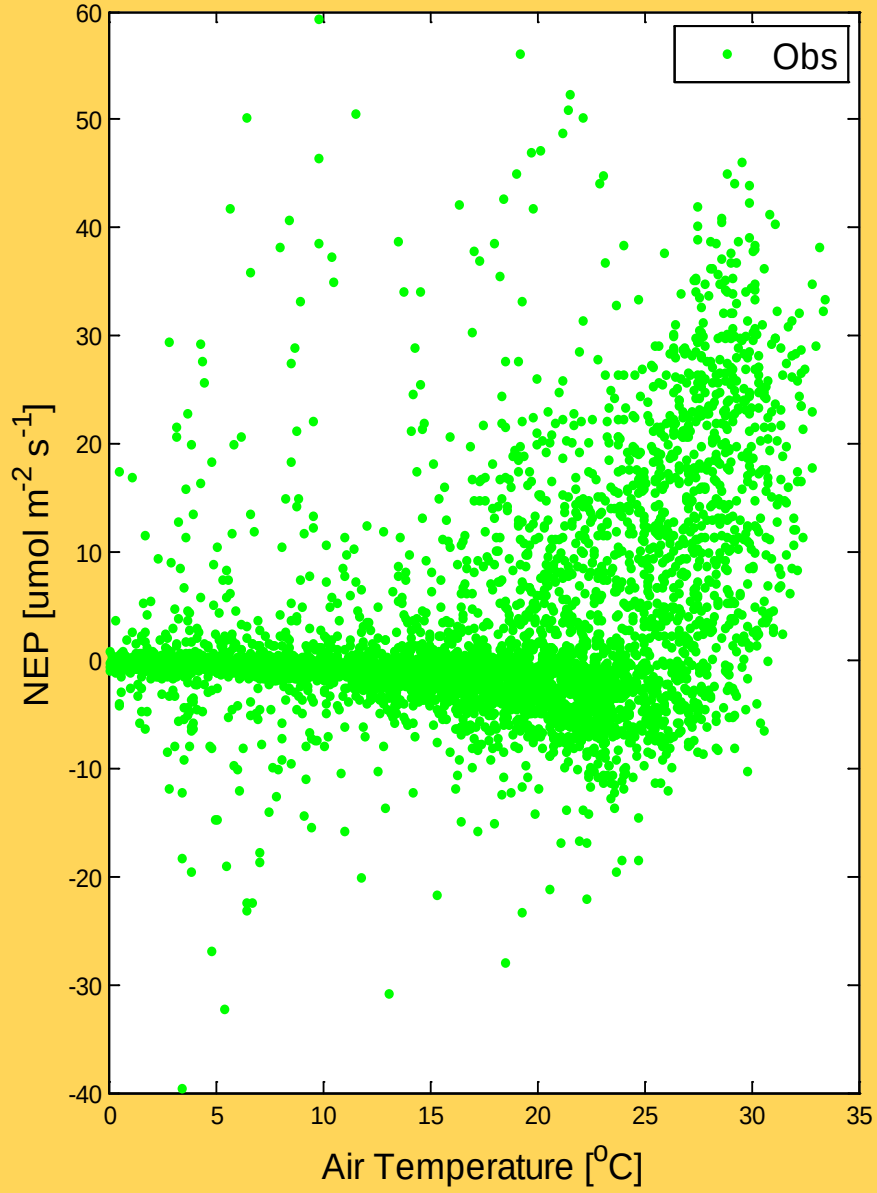

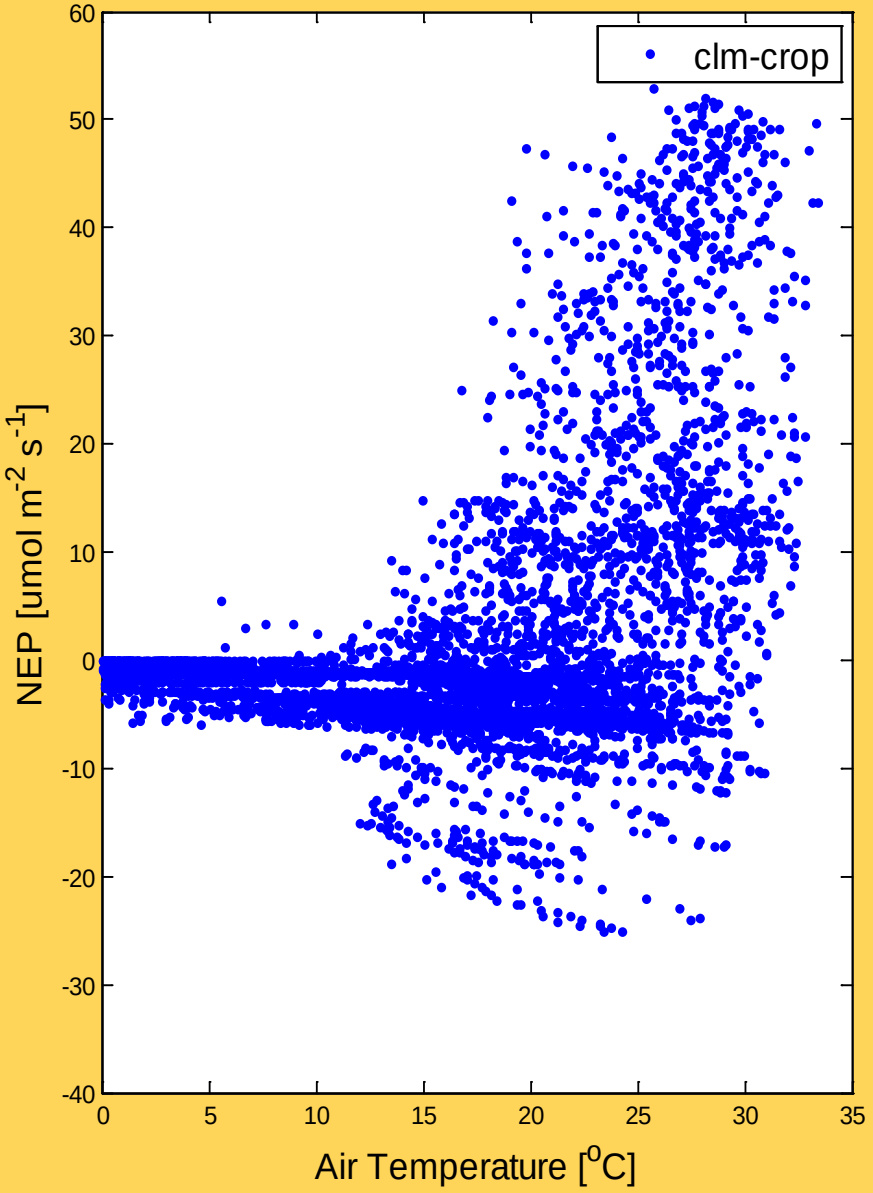

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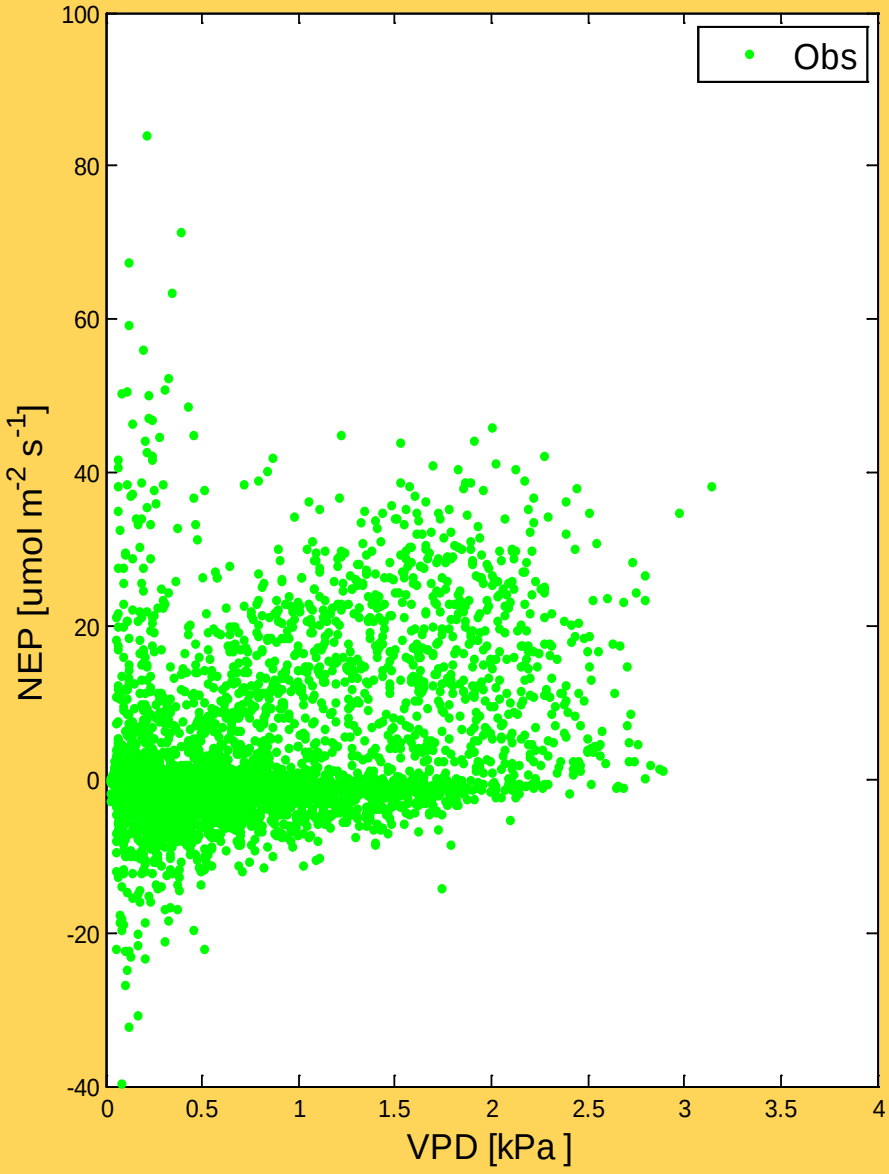

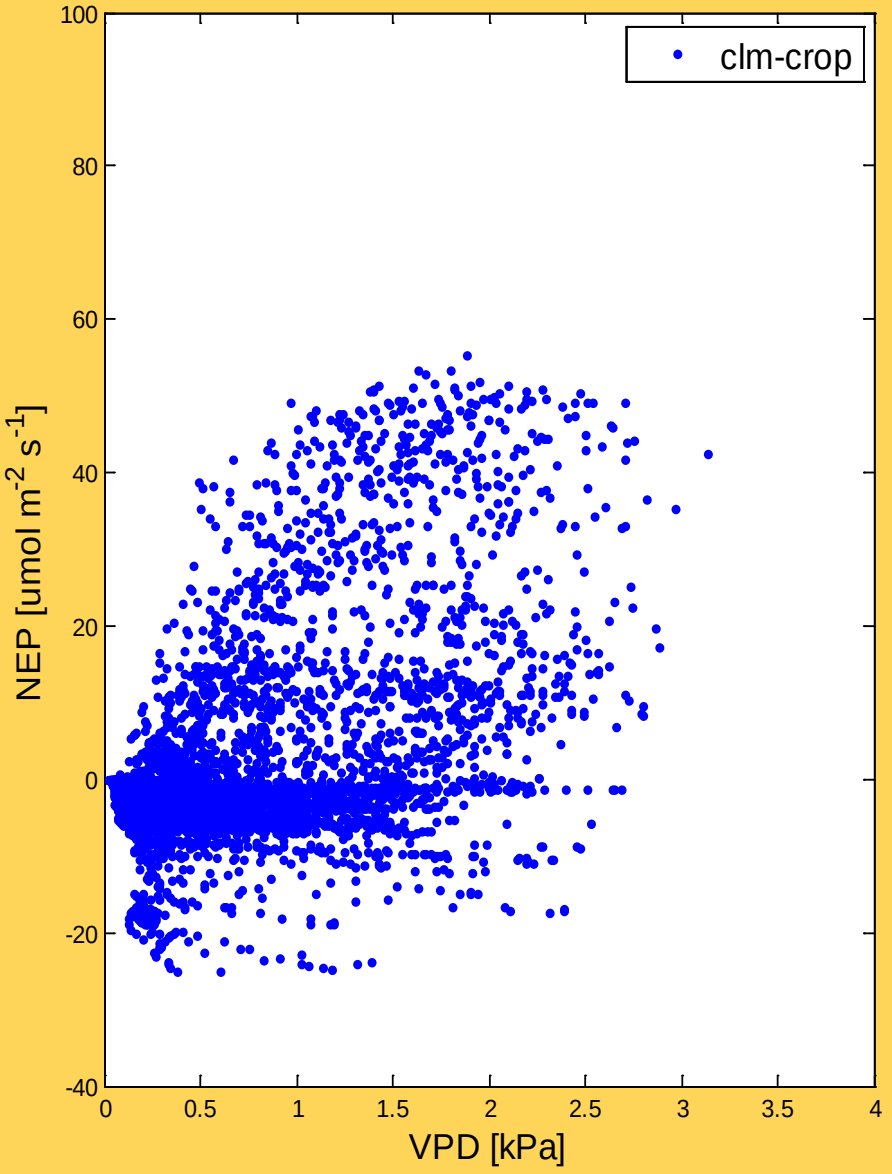

Conclusion

- Phenology
  - Strength:
    - Planting date
    - Maximum LAI for both corn and soybean
    - Timing of grain fill
  - Weakness:
    - Early leaf emergence
    - Time between planting and Max. LAI
    - Early harvest date

Conclusion

- Energy
  - Strength:
    - Rn
    - LE and H during growing season
  - Weakness:
    - Overestimated G
    - Winter Rn/albedo

Conclusion

- NEP
  - Strength:
    - Maximum NEP
    - NEP relation with temperature and water conditions
  - Weakness:
    - Timing of NEP variation (due to LAI)

Acknowledgment

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Contact information:

chen1718@umn.edu