Development of Surface/Land Data for L-A Interaction Studies

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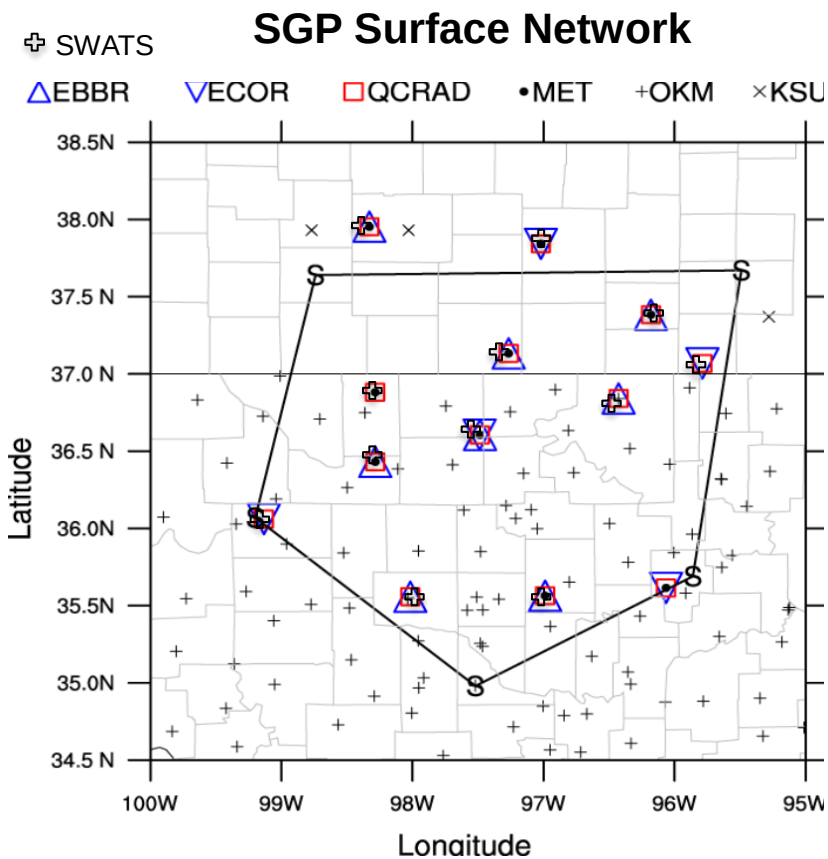
Available Data for L-A Interaction Studies

(with help from Q. Tang, Y. Zhang, C. Sivaraman, L. Riihimaki, M. Jensen, S. Giangrande, M. Huang)

Dataset	Variable	Resolution	Period	Notes
ARMBELAND	Soil temp, moisture, and heat flux	SGP CF, 1hr	1997-2012	Released (LLNL)
ARMBECLD	Cloud and rad.	SGP CF, 1hr	1997-2012	Released (LLNL)
ARMBEATM	LH, SH, Surface Met. data	SGP CF, 1hr	1997-2012	Released (LLNL)
ARMBE2DGRID (STNS)	Surface and land properties	SGP 0.25^0 x 0.25^0 over 3.5^0 x 4^0 domain centered at CF, 1hr. (site locations)	1997-2013	Released for MC3E 2011 data under evaluation (LLNL)
ARM Cont. Forcing	Area mean values	SGP 300km 1hr	1999-2010	working on 2011. Released (LLNL)
ARMBE-CSSEF	ARMBEATM variables with UQ information	SGP all extended facilities, 1 hr	2011, other years being processed	Contact Laura Riihimaki of PNNL
ARMBE-FASTER	Same as ARMBECLD/ATM with higher res.	SGP CF, 1 hr and 5 min.	March 2000 May 2003	Contact Mike Jensen of BNL
NEXRAD Pr -CSSEF	Precipitation	1 km, 0.1^0 and 1^0 over North America		Contact Scott Giangrande (BNL)
PNNL Land Properties	Soil Temp, moisture, and turbulence fluxes	~120 stations from over SGP (OKM, ARM) ~7 stations (ARM)	1999-2012 2000-2012	Contact Moyi Huang of PNNL

ARMBE2DGRID & ARMBESTNS (Qi Tang @ LLNL)



Variable name	Input data (station #)
Surf. u, v, T, q, precipitation	• MET (9) • OK mesonet (127) • KSU mesonet (13)
Surf. P	• MET (9) • OK mesonet (127)
Surf. Heat fluxes	• EBBR (8) • ECOR (5)
Soil Moisture Soil Temperature	• SWATS (12) • EBBR (8)

- *ARMBE2DGRID also includes GOES radiative fluxes at TOA and clouds*
- *OKM soil moisture – a separate effort from Alice Ciallela (XDC/BNL)*

Data Issues

- Land management (land use, surface characteristics, surface types)
- Data density
- Surface heat fluxes – EBBR vs. ECOR
- Soil moisture –
  - SWATS vs. EBBR vs. CO2FLX
  - SWATS: West profile vs. East profile
- Surface energy budget

EBBR (E13) vs. ECOR (E14): Both "Lamont"

A small separation (~350m here) in sensors can result in very different land surface characteristics

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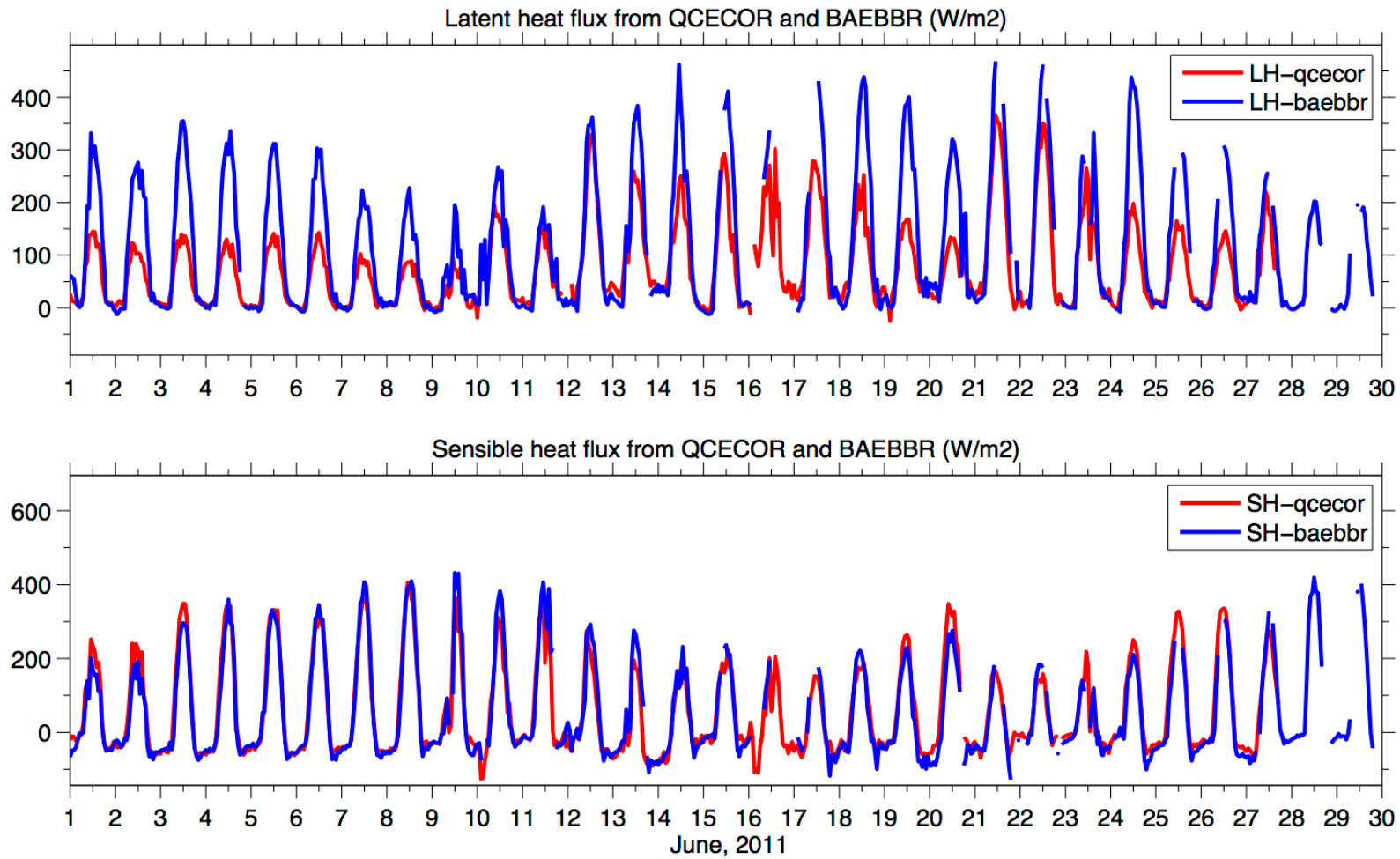
SH/LH: EBBR vs. ECOR



Curtsey of Cheng Zhou

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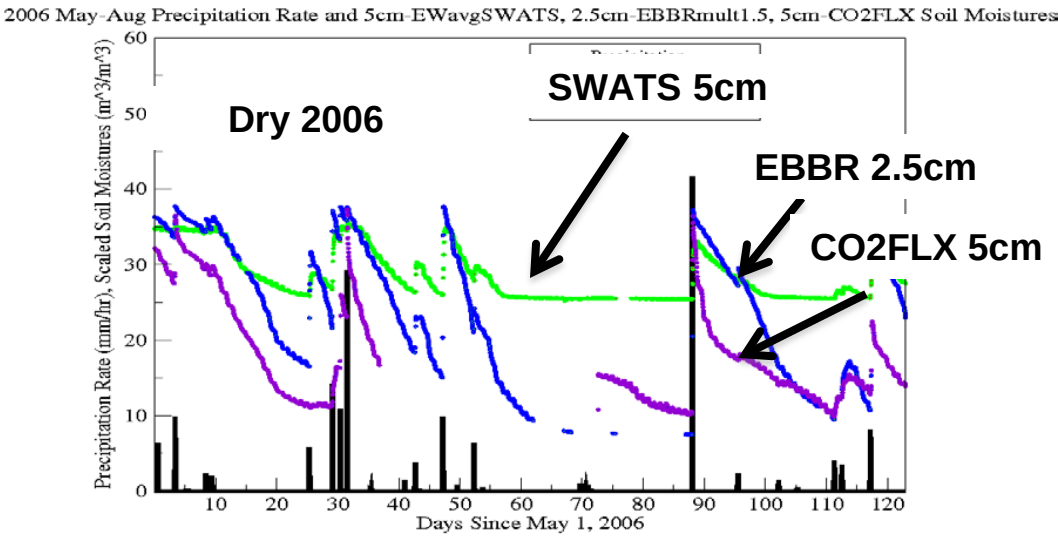
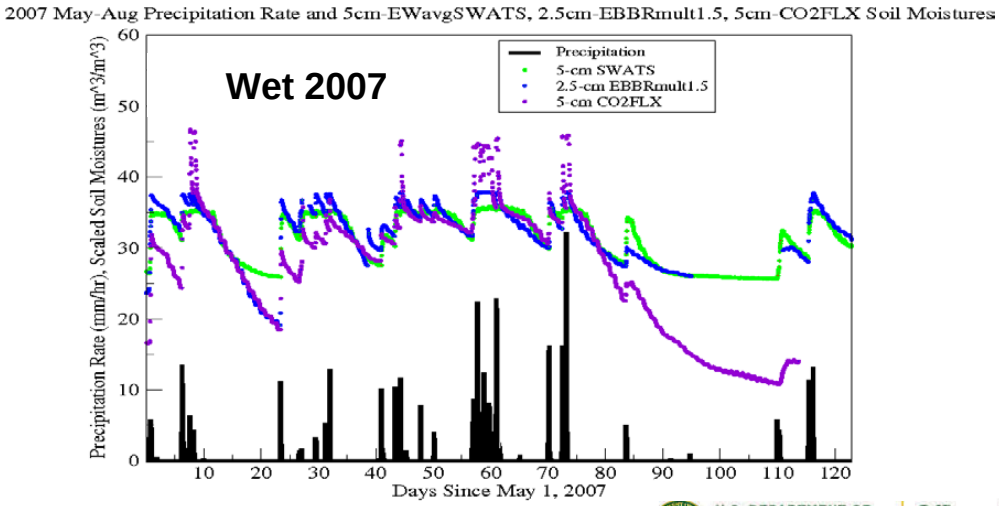
Soil Moisture: SWATS vs. EBBR vs. CO2FLX

Due to sensor limitations, SWATS measurement are "truncated" at a lowest value of ~ 0.25 m_3/m_3; EBBR and CO2FLX display a fuller range of moisture values. However, the EBBR and CO2FLX datasets have many more missing measurements than SWATS.





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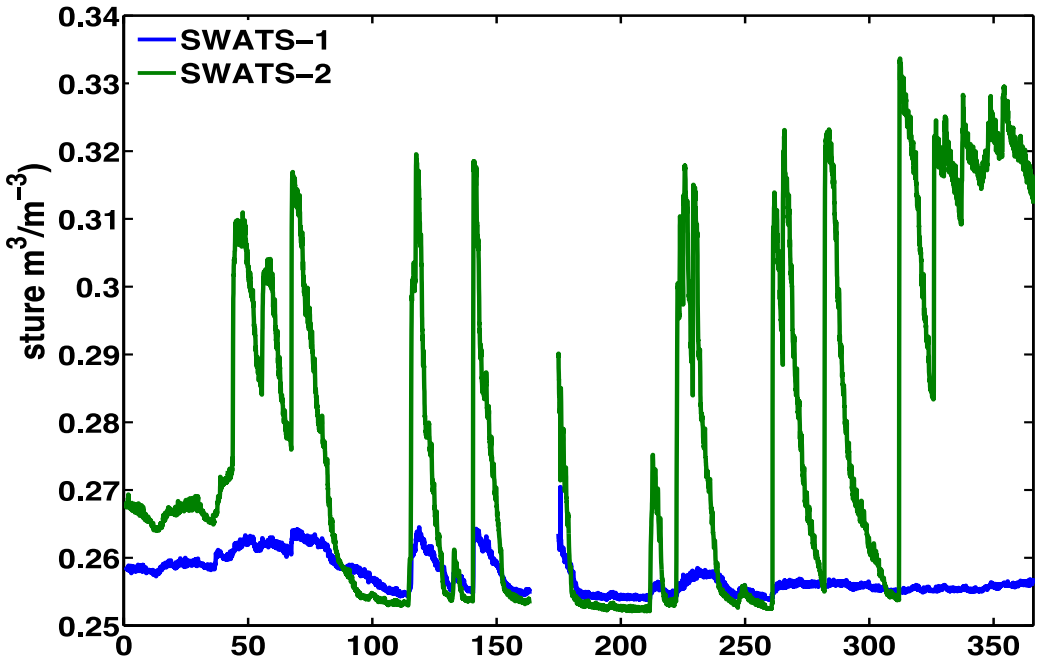
SWATS: West profile vs. East profile

SWATS (E13):

- At 5 cm depth
- 2 profiles 1 m apart at each location (west vs. east)



West Profile is much drier than East Profile. The West-East discrepancy is not shown for data before 2009

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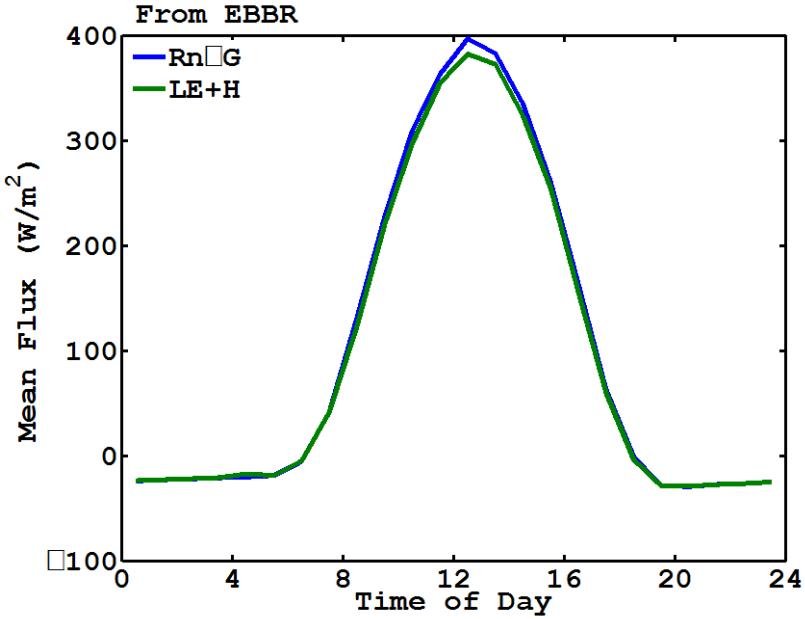
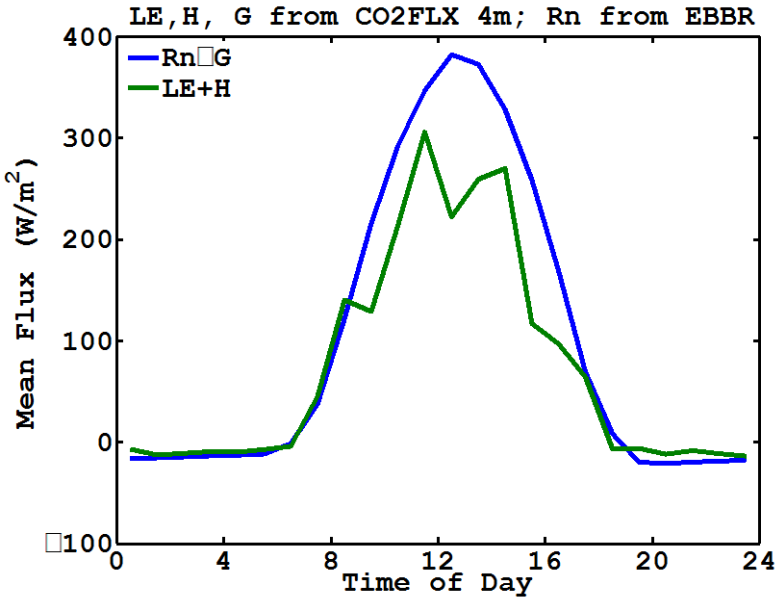
Estimating Surface Energy Budget





- Over 18 EBBR stations available in SGP region, all forcing SEB closure
- Only 1 location of CO2FLX, indicates SEB-closure of ~60-80% at mid-day
- The EBBR SEB balance difficult to conserve in hourly average data because data missing is different for different variables.

Future Plan

- Extend the ARMBE-land datasets to multi-years
- Improve ECOR with newly deployed SEBs
- Merge ECOR and EBBR for a meaningful domain mean
- Investigate impact of issues with surface energy budget on CLM
- Address these data issues and offer potential solutions
  - Land management (land use, surface characteristics, surface types)
  - Data density
  - Surface heat fluxes – EBBR vs. ECOR
  - Soil moisture –
    - SWATS vs. EBBR vs. CO2FLX
    - SWATS: West profile vs. East profile
  - Surface energy budget