Ideas for Synthesis Ameriflux

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AMERIFLUX

What Has Been Done?

- Gap Filling/Neural Networks, Falge
- Methods/Errors, Richardson, Massman, Lee, Schmidt
- Biometry/Eddy Flux Comparisons, Curtis, Gough
- Albedo, Hollinger
- Diffuse Light, Niyogi, Gu
- Budyko Curve, Williams
- Environmental Forcings and Functional Types, Law, Gilmanov, Yi
- Disturbance/Stand Age, Amiro
- Phenology, Richardson
- Land Use and Temperature, Lee
- Gridded Fluxes and Maps, Xiao
- Drought and Extreme Cases, Schwalm, Gu
- Upscaling Fluxes with Remote Sensing, Heinsch, Sims, Mu
- Model Intercomparisons, Levis, Dietze, Schwalm, Schaefer
- Rain Pulses, Ma, Huxman

Current Syntheses

- Who is doing What, Now?
- Wolf: Drought 2012
- Ma: Acclimation of Photosynthesis to Temperature and Soil Moisture
- O'Halloran: Diffuse Light and LUE
- Toomey, PhenoCam and Fluxes
- Xiao, AmeriFlux Spatial Integration over a Decade
- DDB: Correlations between Photosynthesis and Respiration; Extracting Canopy Height from U*; Parameterizing Rb (with Ryu)
- ????

Sweeping the Cream from the Top: Setting Priorities for Future Synthesis

- Questions we have not yet been able to ask with a smaller and coarser network and shorter record
  - Factors driving Inter-Annual Variability of Fluxes
- Questions a Network is best Poised to Answer
  - Temporal Sweep of drought, expansion of insect infestation, occurrence of fire and recovery across space
  - Network Integrated Fluxes
  - Data/Model Assimilation
  - Cause/Effect, Fast/Slow, Physiology/Biogeochemistry, Plant vs Soil

Suggesting Topics

- Derived Quantities from Fluxes

- Interannual Variability

- Processes

- Derived Database

- Case Studies

- Synthesis of Metadata

Derived Quantities from Fluxes

- Pbl height from H
- Canopy Height from u*
- Ecohydrology Rain Stats from rain and soil moisture
- Flux footprint Climatology (sigma u, sigma v)
- Start/End Growing Season from Ps
- Extract soil heat and water transfer properties from the time series of temperature and soil moisture profiles
- Extract Climatologies for Flux Towers

Interannual Variability

– Time Series Analysis, Transfer Entropy/ Granger Causality (Ruddell, Sturtevant, Stoy)

– WUE, NEE and ET and CO_2 trends, Keenan

– Length of Growing Season on Fluxes

  • Covariance with Drought and Heat Spells

– Leads and Lags

– Extreme Events on Fluxes

Processes

– Controls of Photosynthesis on Respiration
– Diffuse Light and Photosynthesis, Test Theory
– Surface Resistance, Canopy Ball Berry
– Soil Moisture and Rainfall Variability on Fluxes
– Acclimation of Temperature Optimum
– Complimentary Evaporation
– Watershed Water Budget vs ET
– Flux Partitioning, T and ET
  • Scanlon Method
– Understory vs Overstory CO_2 fluxes
  • Autochambers, Soil CO2 Profiles

Derived Database

– Gridded Fluxes

– Gridded Climate

– Raw Data Central

  • Examine Turbulence Statistics across spectrum of short to tall, smooth to rough, flat to sloping terrain

Case Studies

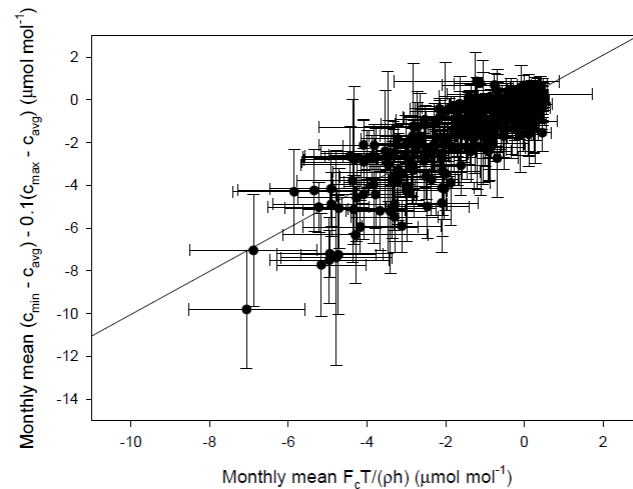- Drought
- Management
- AmeriFlux and Cosmos, PhenoCam
- Expand NEE and Biometry Analysis across time and Space
- Test Fluorescence based GPP
- CO_2 Fluxes and Seasonal Drawdown in CO_2
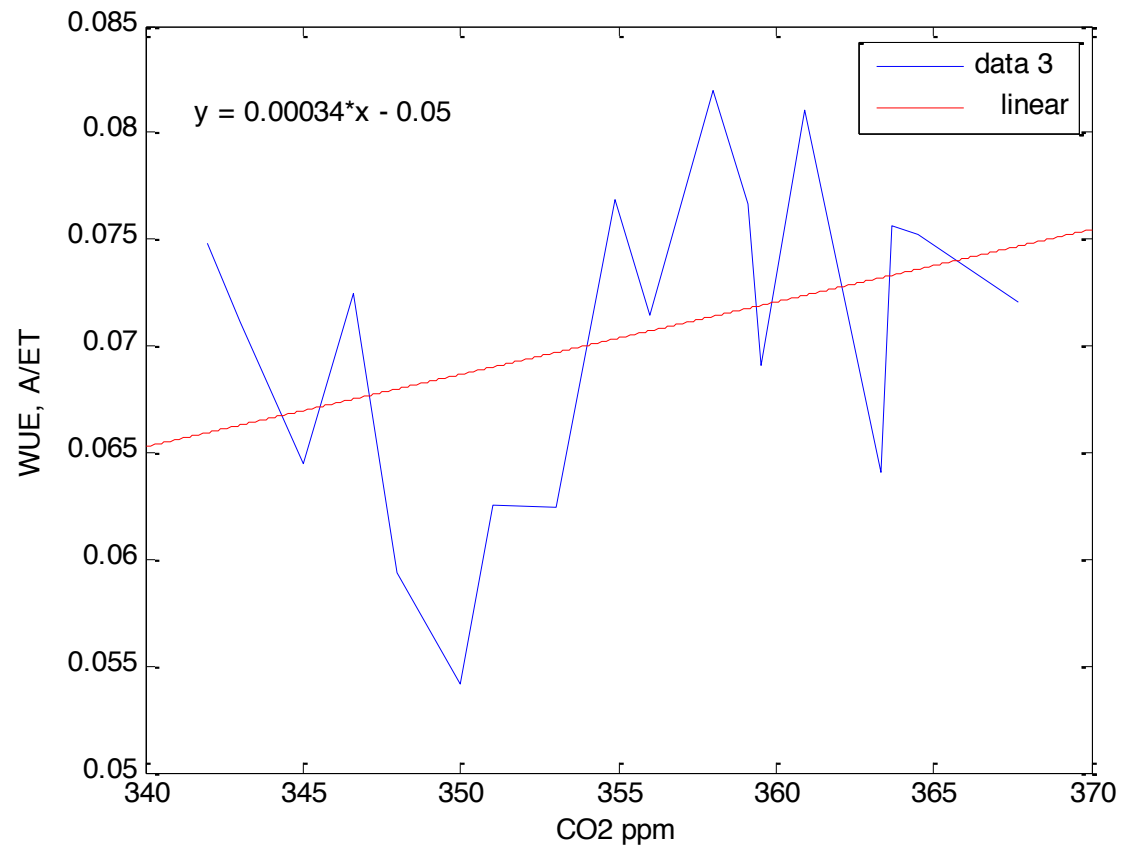
Missing Data Outputs

- Sigma u and Sigma v for Flux Footprint models
- Better Site Information
    - LIDAR, Soil Moisture, LAI, Phenology, Diffuse Radiation, 4 band Net Radiometers, Better Precipitation Measurements (rain/snow)

Lingering Group Products

- Ameriflux Overview paper, BAMS?

- Estimates of GPP based on time Series of [CO2], Julie Styles

WUE and CO2:
Is it Plausible? Computations with Canoak

What Do You Need from the Data System?

- Please Provide Suggestions on Tools/Products
- I'd like to be able to go to a site and get access to all the flux data, metadata and complementary data
  - Buttons for downloading LAI, soil moisture data

Suggestions?? Discussion??