

Junior Faculty Forum  
Day 3  
Biomass Burning Section

# Schedule

- 0900-0920 : Ave Arellano
- 0920-1020 : Discussion
- 1020-1040 : Break
- 1040-1110 : Tom Moore
- 1110-1230 : More discussion, and tasking
- 1230 : end
- 1300 : shuttle departs

# Wiki

- We will post all talks as PDF in the Wiki
- If you want us to post a talk different from the one we have, please send it to us today or tomorrow
- We will use the Wiki for preparing the paper

# Meeting Summary

- This meeting collected a tremendous quantity of scientific output
  - Nearly all from the last 5 years
- From work in many different disciplinary orientations, common threads emerged
  - Areas where rapid progress is possible
  - Areas of key limitations in:
    - Current theoretical understanding
    - Current modeling capabilities
    - Current observation systems
- Challenge == Opportunity

# Common Threads

- More General
  - Error budgets and propagation
  - Numerical estimates of uncertainty
  - Process studies
- More Specific
  - Fire information below the pixel level, esp. FRP
  - Temporal resolution of emissions products
    - Diurnal cycles of fire behavior and emissions
  - Initialization of Plume Vertical Distribution
  - Emission Factors

# Common Threads I: Generalities

- Quantify Uncertainties
  - Ichoku, Schroeder, McCarty, Rivera, others: quantify uncertainty of specific components using detailed observations
  - Randerson, Ellicott, others: attempting formal propagation of error through complex formulation
  - Mian Chin, Pfister, Tong, others: sensitivity analysis using models to determine “downwind” effects of uncertainties
- Process studies:
  - Wang, Sorooshian, Petters: critical mechanisms of cloud-aerosol interaction
  - Coen, Peterson: specific conditions of fire ignition and spread
  - Reid: downwind evolution of species
  - Reid, Randerson: critical evaluation of model sink terms

# Specifics: Sub-Pixel Fire Properties

- Active fire will always be a fraction of a moderate-resolution pixel
  - for burned area, just “much of the time”
- FRP is a potentially valuable tool for improving emissions estimates
  - Ichoku, Schroeder, Peterson: FRP must be examined using high-resolution observations
  - Ichoku, Zhang, Ellicott, Petrenko: Multiple methods to do time integration of FRP

# Specifics: Temporal Resolution of Emissions Estimates

- Mian Chin, Petrenko, Randerson: Daily resolution is definitely better than 8-day or monthly emissions
- Wang: Mesoscale simulation of transport requires diurnal cycle
- Randerson, Schroeder, Zhang, Ellicott: satellite obs. Of fire diurnal cycle
  - Limitations of GOES sensors must be considered
  - Systematic differences among fire regimes / ecosystems



# Specifics: Vertical Distribution at Source

- Coen: Vertical distribution is the end result of some serious fluid dynamics
- Val Martin: MISR observes about 5-20% of plumes reaching into free troposphere
  - How to infer behavior at other times of day?
  - 1-D plume rise model results:
    - Plume rise model requires fire energy inputs that are difficult/impossible to get accurately
    - Plume rise model results agree poorly with MISR observations

# Specifics: Emissions Factors

- Many new mmts since Andreae and Merlet
  - Update available or coming soon
- Mian Chin: aerosol EFs well above A&M needed to reproduce observations with GOCART
- McCarty: EFs matched to stratified fuel maps (e.g. crop type) would be a substantial upgrade for applications. Also, Can we identify some predictors for variation in EFs?

# Outline of BAMS paper

Introduction & Rationale

Recent Results

Outstanding Issues

Frontiers