Discussion Session: Land-Atmosphere Interactions  
(Sep 30: Tuesday afternoon)  
Lead: Ruby Lueng, Recorder: Ken Mitchell

- **Impact of past field experiments and role of observations**
  - Need to further exploit observations from past fields campaigns (NAME, observations utilized by the several PILPS phases, etc) rather than launch a new field campaign
    - Synthesis of field campaign observations into common formats at a single common archive and distribution center vastly increases the use and application of field campaign data, including in model validation studies
  - Field campaigns benefit from a priori statement of science questions to be addressed by field campaign
    - VOCALS and IAS field campaigns are primarily ocean-atmosphere field campaigns but would welcome and benefit from science questions with a land-atmosphere focus
  - FLUXNET observations, including the AMERIFLUX observations, should be exploited more heavily by CPPA land-atmosphere investigators
    - It is difficult to access the Canadian and European data sets of FLUXNET
    - RECOMMENDATION: CPPA Program Managers should investigate the availability of FLUXNET and AMERIFLUX observations to CPPA-funded PIs by approaching the U.S. Water Cycle Steering Group to press for access to worldwide FLUXNET observations
Discussion Session: Land-Atmosphere Interactions  
(Sep 30: Tuesday afternoon)  
Lead: Ruby Lueng, Recorder: Ken Mitchell

- **Future Near-Term Priorities and Specific Activities**
  - Investigate causes of differences and uncertainty across uncoupled land models that are provided with identical forcing
  - Explore consolidation methods to merge the results from different uncoupled land models that are provided with identical forcing
  - Extend land model calibration studies: go beyond calibration to use the validating observations to identify missing physical processes
  - Continue to support and pursue the various phases of GLACE-type studies that investigate the extent and causes of differences in the strength of the atmospheric response to land surface anomalies in various land models in various GCMs
  - Conduct experiments (e.g. MERD) to investigate extent to which seasonal predictions by Regional Climate Models can enhance seasonal prediction skill over and above the driving coupled GCMs
  - Land Data Assimilation Initiatives: See next Frame
Discussion Session: Land-Atmosphere Interactions  
(Sep 30: Tuesday afternoon)  
Lead: Ruby Lueng, Recorder: Ken Mitchell

• Need to accelerate progress on Land Data Assimilation Systems (LDAS)
  - Need to move beyond “open loop” LDAS systems that merely assimilate forcing data to assimilation of land state data (soil moisture, snow cover, skin temperature)
  - AMSR-E soil moisture retrievals: new retrieval algorithms have emerged that substantially improve the dynamic range and reduce the low bias of AMSR-E retrievals
  - SCAN network in-situ soil moisture observations: suffer from a very flat dynamic range at many locations
  - ECMWF technique of assimilating screen-level atmospheric observations of 2-meter air temperature and dewpoint yield better surface fluxes but poor land surface hydrology (high bias in runoff, poor seasonal cycle of soil moisture)
  - Snow Cover data assimilation: considerable success has been demonstrated in the research community
  - Skin temperature data assimilation: difficult owing to low thermal inertia of skin temperature and many sources of simulated skin temperature error other than errors in soil moisture (e.g. solar radiation errors, advection errors, errors in PBL physics)
  - Streamflow observations: great potential exists assimilation of streamflow data
  - Coupled versus Uncoupled LDAS: Need to investigate and better understand why it is difficult to get control runs of uncoupled LDAS to agree with control runs of coupled LDAS when the uncoupled system is provided with the same land surface model, same parameters, and same forcing output of the coupled system
Discussion Session: Land-Atmosphere Interactions  
(Sep 30: Tuesday afternoon)  
Lead: Ruby Lueng, Recorder: Ken Mitchell

- **Paths to Improved Operational Climate/Hydrologic Predictions**
  - Sustain and encourage ties between CPPA PI external research and the CPPA Core Projects at NCEP/EMC and NWS/OHD
  - Synthesize/consolidate the results of CPPA PIs who are investigating/validating the performance of the NCEP Noah LSM or the OHD SAC model
    - One focus should be on those independent studies that reveal similar biases in Noah LSM or SAC (recent example: early timing bias in Noah depletion of snowpack)
  - Exploit recent CPPA-funded PI research that has added multiple physics options to the Noah LSM (e.g. new generation of Noah LSM developed at University of Texas/Austin)
  - Earth System Modeling Framework Initiatives: spur the development and application of common flux couplers for land-atmosphere, ocean-atmosphere, ice-atmosphere
  - Solicit GFDL to provide more access to and utilization of the GFDL land surface model for external researchers (GFDL should provide an uncoupled version of the GFDL LSM that the research community can use)
Issues from Session Oral Presentations

• Land forcing and implications to predictability (experiments w/o feedbacks and model dependence; diagnosing differences in model response)
• Biases in LSMs
• Physically based model (complexity) vs model tuning in improving LSM simulations
• Use of data assimilation
• Optimization approach to model tuning; value of data other than streamflow, and caveats
• Role of observations in developing drought monitor products or constraining MME estimates; resolving uncertainty across NLDAS models
• The challenge of using field data to improve LSMs
The following four frames were used to stimulate the discussion session that is summarized in Frames 1 through 4 above.
Impact of Past Field Experiments

• Synthesis of field experiments to improved understanding and modeling (e.g., NAME)
  - Model improvements
  - Data analysis
Future Near-Term Priorities and Specific Activities

- Data requirements
- Modeling activities
- Potential future field campaigns
Paths to Improved Operational Climate/Hydrologic Predictions

• Fusion of research and operational activities
Gaps of Knowledge

• Research focus and opportunities
• The role of LA interactions on predictability
• Modeling of land/vegetation processes and LA interactions
• Data needs