Entrepreneurial talks (10 minutes each, including questions)

- Reto Stockli - Remote sensing data assimilation for a prognostic phenology model in CLM
- Adam Schlosser - Coupling CLM to ecologic (TEM) and biogeochemistry modules (DNDC)
- Menglin Jin - Improved Arctic and Antarctica surface height
- Michael Barlage - Including semi-arid shrubs into CLM-DGVM

Update on progress towards CLM4

- Keith Oleson – Weak upper-soil moisture variability in CLM3.5
- Dave Lawrence – Review of LMWG development activities

Open Discussion on CLM4 priorities
LMWG Development Activities

- Community Hydrology project  
  K. Oleson, D. Lawrence, P. Thornton, S. Levis, NCAR; L. Yang, G. Niu, L. Gulden, U. Texas; B. Dickinson, G. Tech; R. Stockli, CSU

  • CLM3.5 – major reworking of hydrology scheme plus surface dataset, canopy integration, etc.

  • CLM3.5 Public Release occurred on May 25

    http://www.cgd.ucar.edu/tss/clm/distribution/clm3.5/

  • Status: Need to resolve upper soil moisture variability issue
LMWG Development Activities

– Community Snow Project  
  D. Lawrence, K. Oleson; M. Flanner, C. Zender, UCI; G. Niu, L. Yang, U. Texas; X. Zeng, U. Ariz.

  • snow cover fraction
  • snow burial fraction for short vegetation
  • SNICAR – vertically distributed radiative heating, snowage, aerosols on snow
  • Status: testing in CAM3.5-CLM3.5
Results from Community Snow Project:
Snow Cover Fraction

Community Snow - Obs

Control - Obs

Community Snow - Control
Results from Community Snow Project: Visible black sky albedo

Community Snow - Obs

Control - Obs

Community Snow - Control

Case1+ (green) and Case2+ (red) relative to obs

Model relative to Obs
Results from Community Snow Project: Surface air temperature

Community Snow - Obs

Control - Obs

Community Snow - Control
LMWG Development Activities

- Urban model  
  K. Oleson, G. Bonan, NCAR; J. Feddema, U. Kansas

• Status: next on list for implementation into CLM3.5 trunk, derivation of global datasets, testing
Fine mesh – high resolution land and downscaling  
D. Gochis, A. Hamann, G. Bonan, T. Craig, D. Lawrence, NCAR

- Separate land grid from atmospheric model grid
- Temperature (lapse rate), specific humidity, and rain/snow partitioning are adjusted, more work needed on spatial distribution of precipitation
- Status: Continued research and development, checked in CLM3.5, software engineering for very high resolution simulations, science plan

Integration of CLM-CN with CLM-DGVM  
S. Levis, P. Thornton

- Status: Conceptual stage, work to begin shortly
LMWG Development Activities

- **Organic soil / deeper soil column / bedrock**
  
  D. Lawrence; A. Slater, CIRES; V. Romanovsky, U. Alaska

- **Improved soil temperature, permafrost simulation**

- **Status: testing in CLM3.5, develop accelerated spinup of deep soil temperatures, research variable depth to bedrock**
LMWG Development Activities

- Ice sheet model  B. Lipscomb, LANL; M. Holland, D. Lawrence, M. Vertenstein, S. Levis, E. Kluzek, NCAR
  - GLIMMER mass balance model
  - Status: Implementation and testing

- Irrigation  S. Levis; B. Sacks, U. Wisconsin; L. Yang, U. Texas
  - Status: research and development, identify ‘best’ implementation
  - Issues include source of water, spatial distribution of irrigation, how much water, time of day to irrigate, irrigate on separate landunit/column for crops
LMWG Development Activities

- **Roughness length, sparse and dense canopies**
  X. Zeng, A. Wang, U. Arizona
  - Increase consistency of roughness length and displacement height for sparse and dense canopies
  - Status: needs to be tested in CAM3.5-CLM3.5

- **Modified Richard’s equation**
  X. Zeng, M. Decker, U. Arizona
  - New form of Richard’s eqn.
  - Status: needs to be tested in CLM3.5, LMWG approval
LMWG Development Activities

- **Dynamic wetlands (lakes)**  
  S. Swenson, D. Lawrence, NCAR
  - MODIS derived land cover, essentially no wetlands
  - Building block for prognostic natural methane sources
  - Status: Research phase ... can fraction water table at surface be exploited

- **Shrub vegetation type in DGVM**  
  X. Zeng, M. Barlage, U. Arizona
  - Status: ???

- **Prognostic canopy airspace**  
  S. Levis; F. Hoffmann, ORNL
  - Status: stalled?

- **Soil degradation**  
  J. Feddema, U. Kansas
  - Status: Conceptual
Other activities

- **LMWG SWIKI**
  - email your CLM publications to Nan (nanr@ucar.edu)
- Diagnostics package
- Validation metrics (model-to-model comparisons)
  - T, P (snow cover fraction, snow depth, surface albedo)
  - RMSE, bias, annual cycle correlation, % area better/worse
  - Koppen climate-vegetation classification
- Software engineering
  - Removal of (almost) all global arrays, improves memory scaling
  - Parallel I/O
Priorities for CLM4: 
Target ‘frozen’ model by Jan-Mar 2008

- Hydrology: resolve upper-soil moisture variability issue
- Snow: SCF, SBF, snow age, vertically resolved heating
- Urban model
- Fine mesh – high resolution land and downscaling (RTM?)
- Integration of CLM-CN with CLM-DGVM
- Ice sheet model
- Organic soil / deeper soil column / bedrock
- Irrigation (dynamic crops?)
- Roughness length, sparse and dense canopies
- Shrub vegetation type in DGVM
- Prognostic canopy airspace
- Modified Richard’s equation
- Dynamic wetlands (lakes)
- Soil degradation