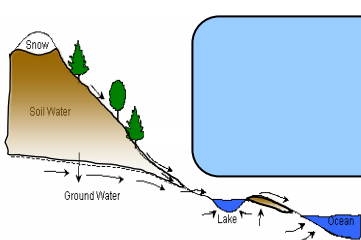# LMWG Meeting Agenda

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

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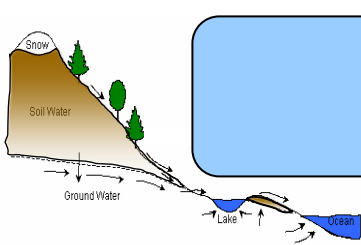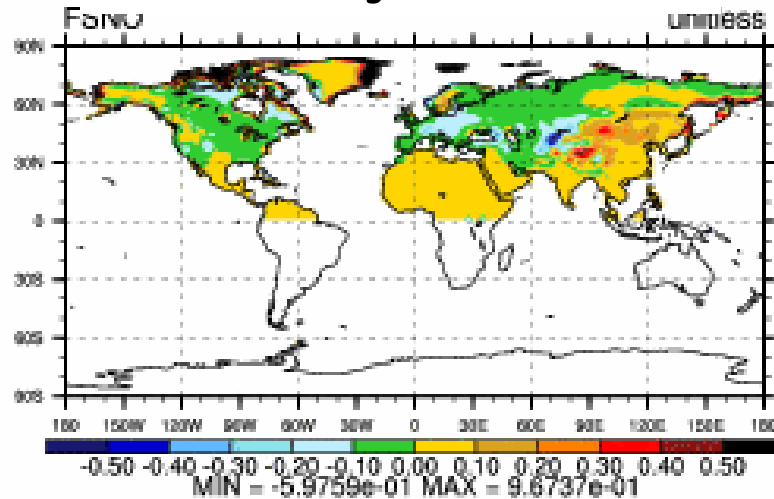
– **Community Snow Project**   D. Lawrence, K. Oleson; M. Flanner, C. Zender, UCI; G. Niu, L. Yang, U. Texas; X. Zeng, U. Ariz.

- snow cover fraction

- snow burial fraction for short vegetation

- SNICAR – vertically distributed radiative heating, snowage, aerosols on snow
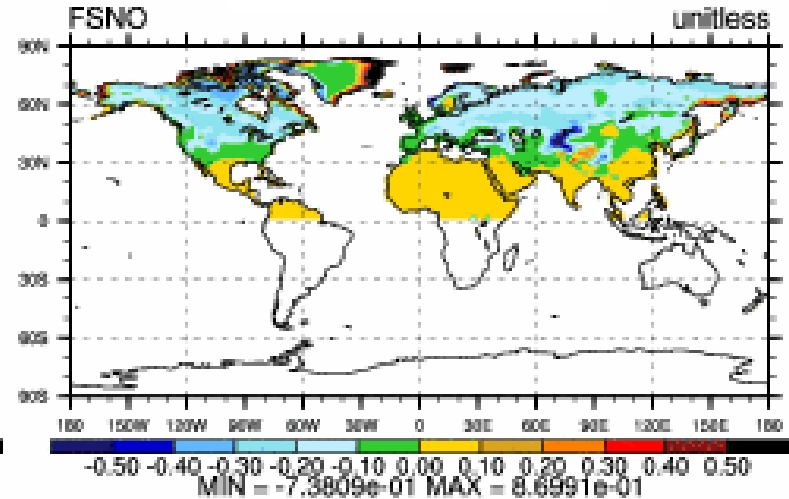
- Status: testing in CAM3.5-CLM3.5
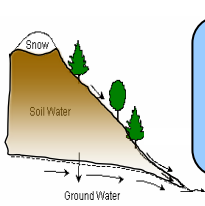
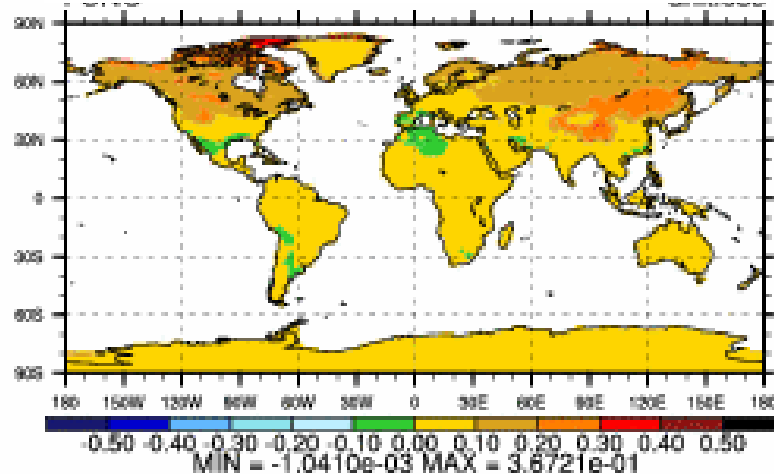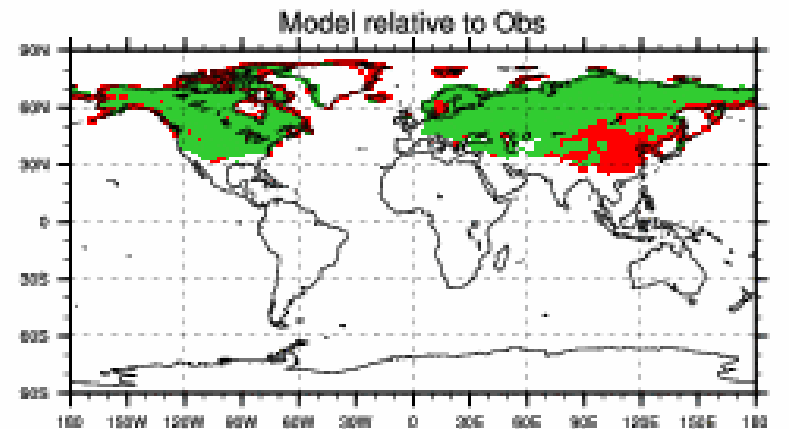# Results from Community Snow Project: Snow Cover Fraction
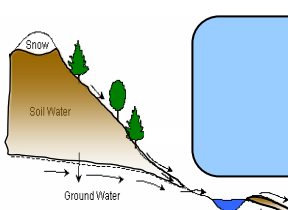
Community Snow - Obs

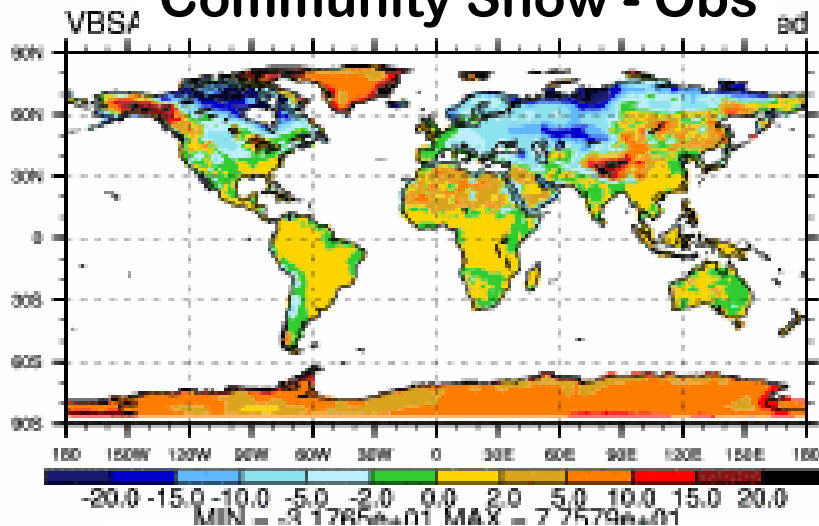## Control - Obs

Community Snow - Control
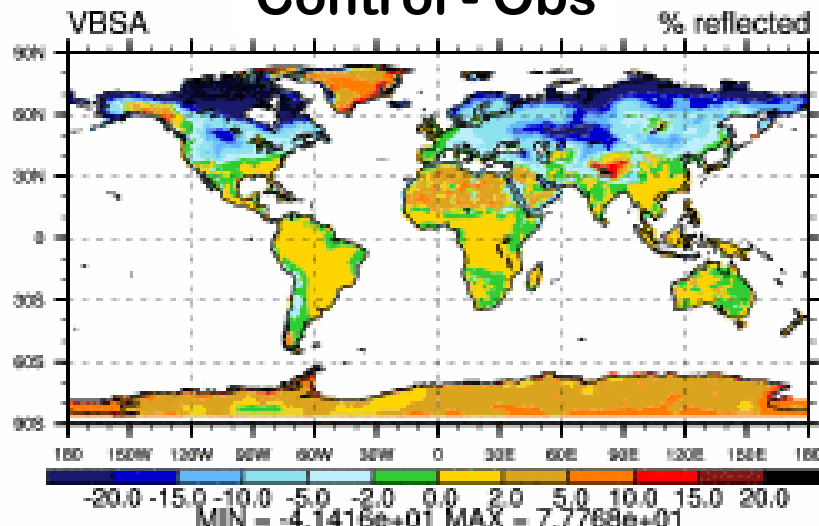

Case1+ (green) and Case2+ (red) relative to obs

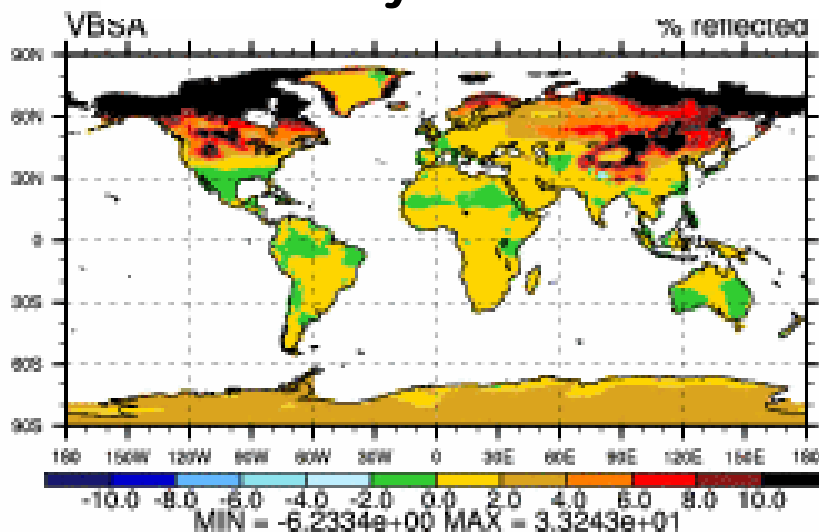# Results from Community Snow Project:
Visible black sky albedo

Community Snow - Obs

VBSA

MIN = -3.1786e+01 MAX = 7.7579e+01

Control - Obs

VBSA   % reflected

MIN = -4.1416e+01 MAX = 7.7768e+01

Community Snow - Control

VBSA   % reflected

MIN = -6.2334e+00 MAX = 3.3243e+01

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

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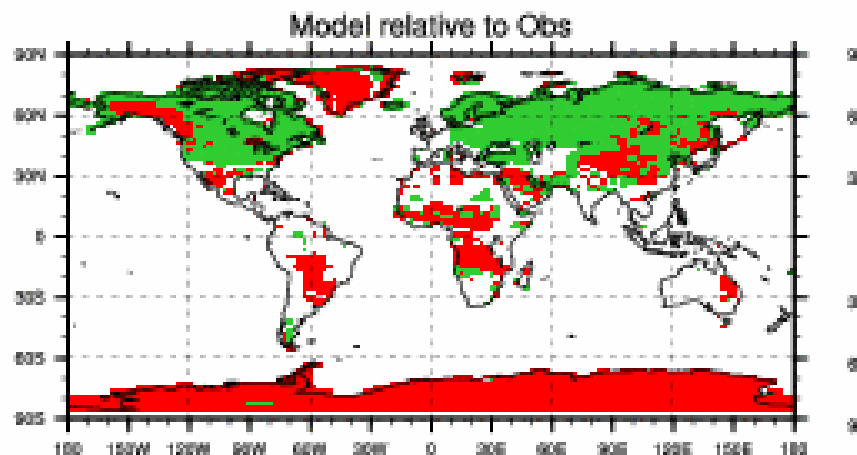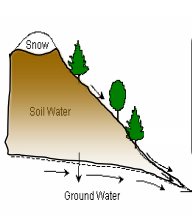
Results from Community Snow Project:
Surface air temperature

Community Snow - Obs

TSA · C

MIN = -1.0743e+01 MAX = 1.4105e+01

Control - Obs

TSA · C

MIN = -1.0702e+01 MAX = 1.4102e+01

Community Snow - Control

MIN = -2.7237e+00 MAX = 2.1055e+00

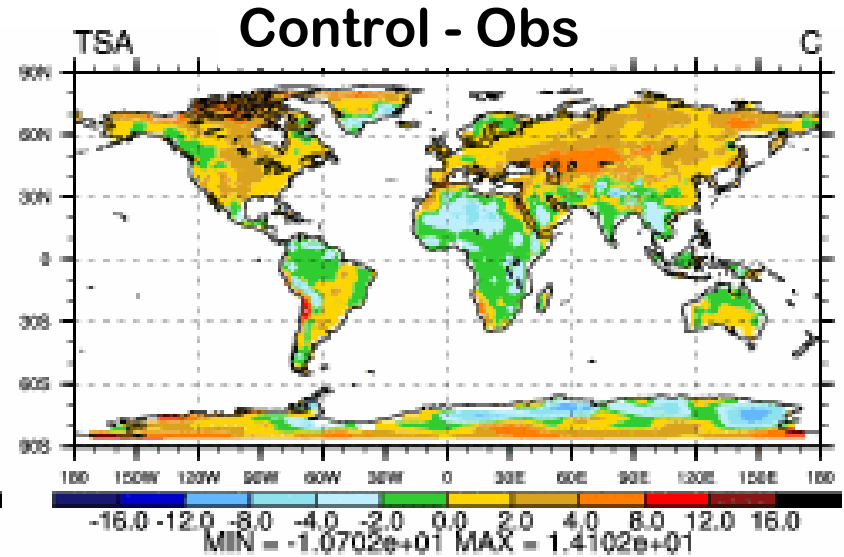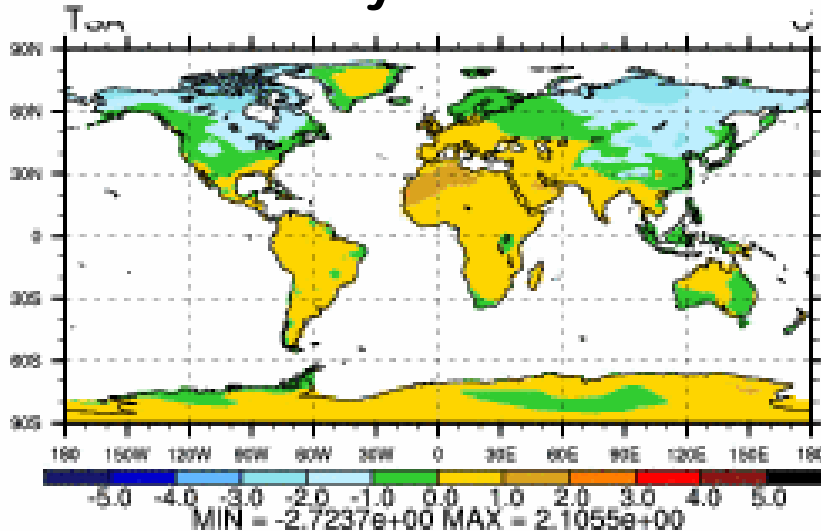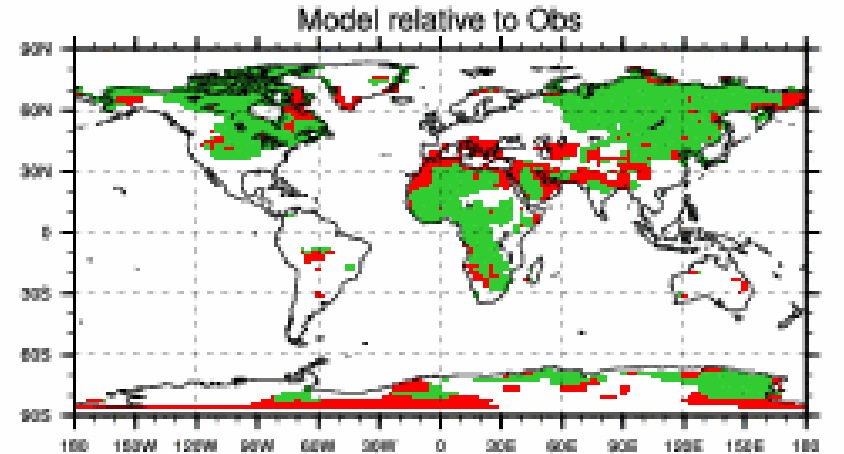## Case1+ (green) and Case2+ (red) relative to obs

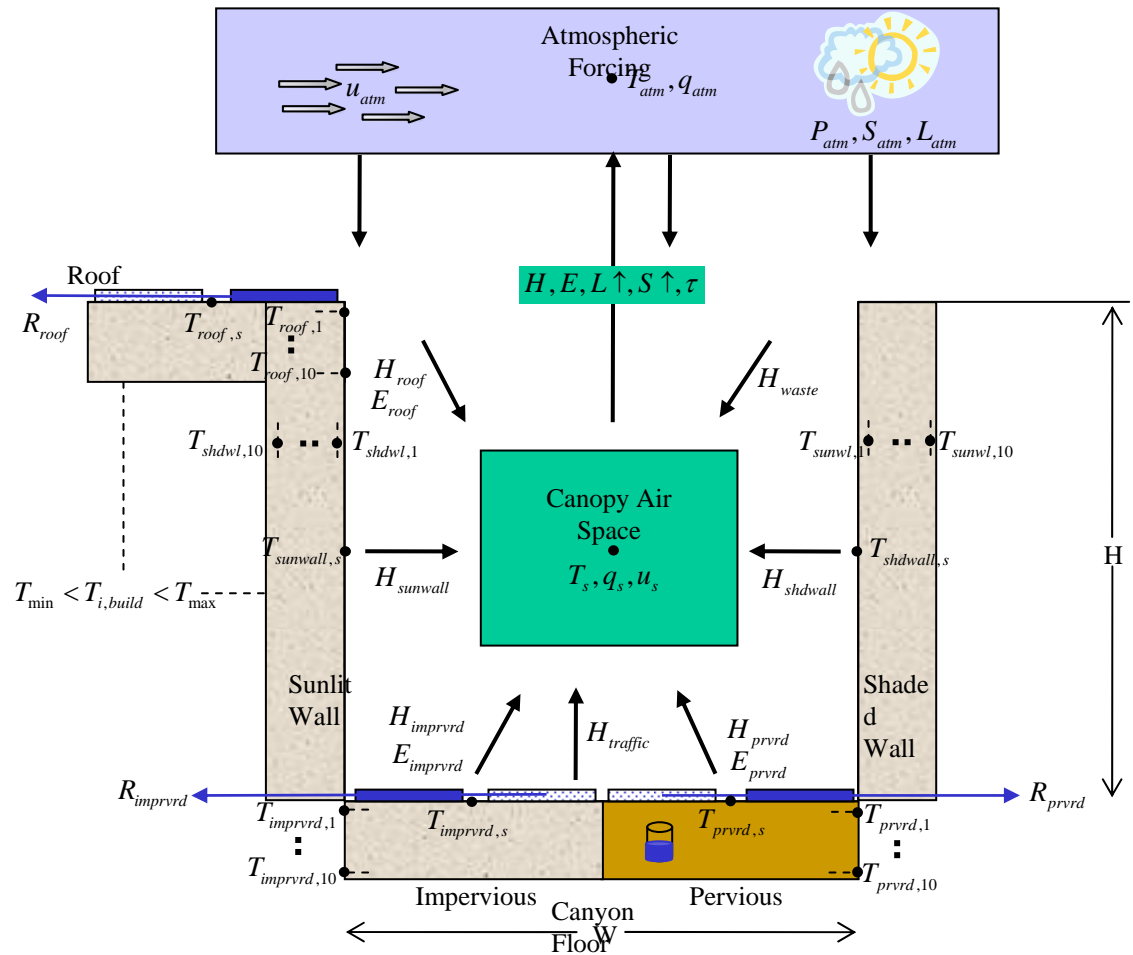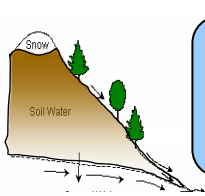Model relative to Obs

– 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**

LMWG Development Activities

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
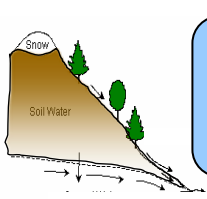
– Organic soil / deeper soil column / bedrock

D. Lawrence; A. Slater, CIRES; V. Romanovsky, U. Alaska

- **Improved soil temperature, permafrost simulation**

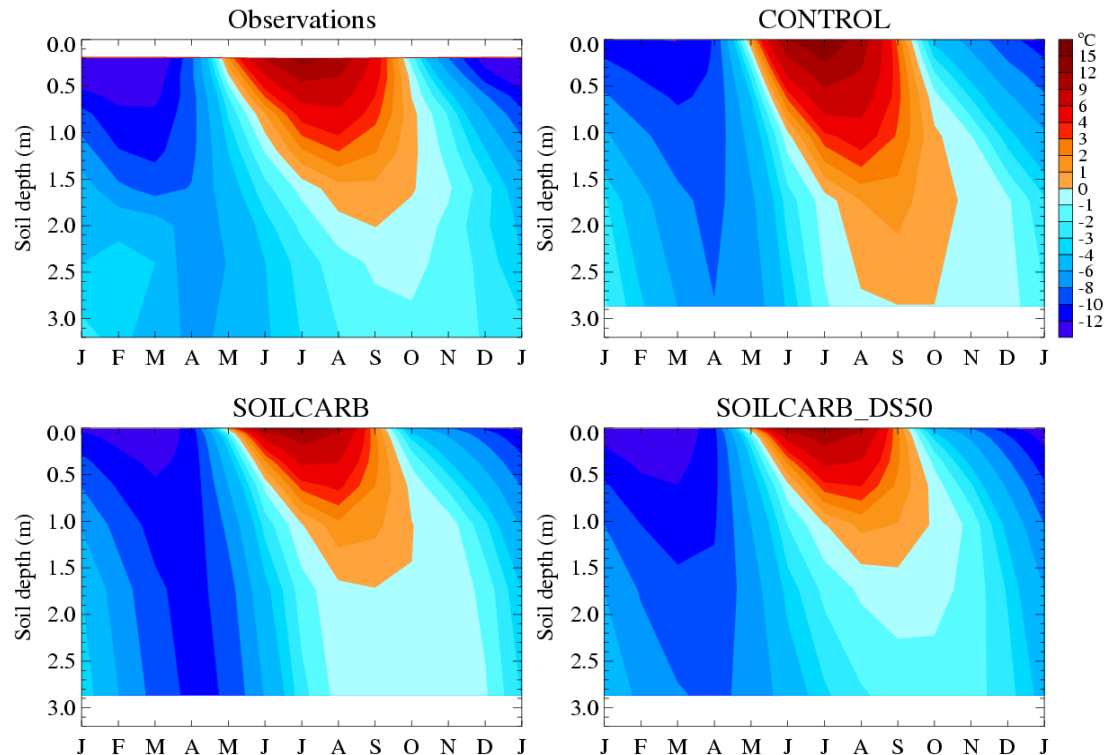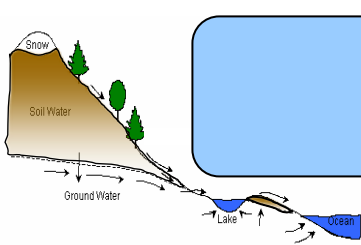- **Status: testing in CLM3.5, develop accelerated spinup of deep soil temperatures, research variable depth to bedrock**

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**
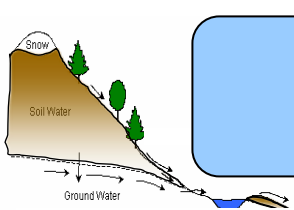
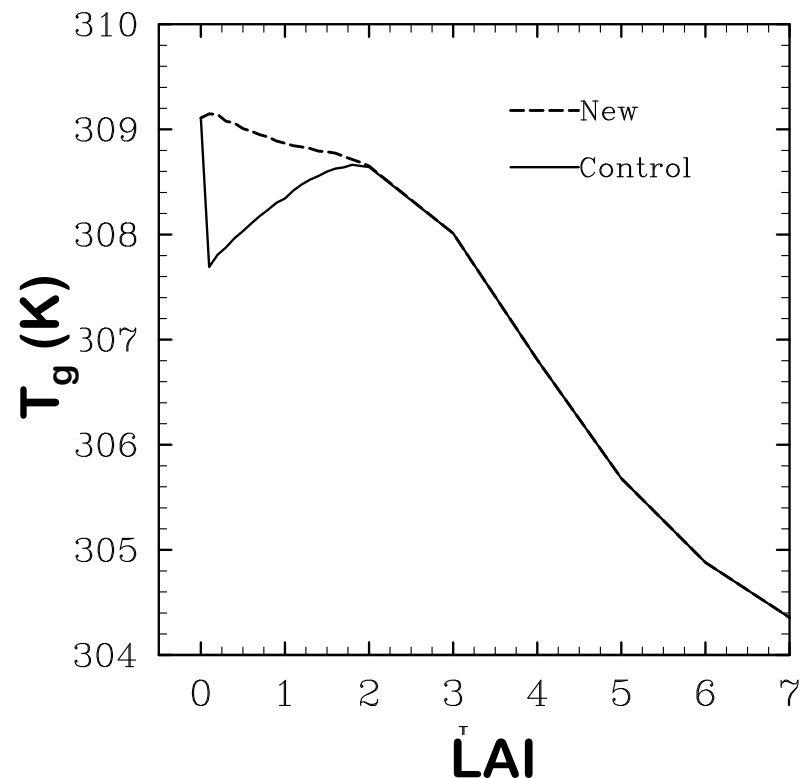– **Roughness length, sparse and dense canopies**
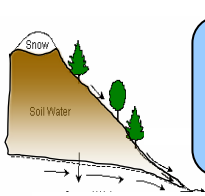 **X. Zeng, A. Wang, U. Arizona**

  • **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
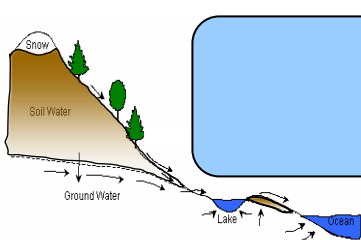
Other activities

- **LMWG SWIKI**   http://swiki.ucar.edu/ccsm/47

  – 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**
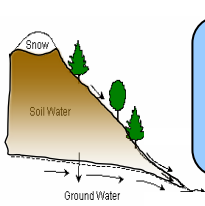
Priorities for CLM4:
Target 'frozen' model by Jan-Mar 2008

- 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