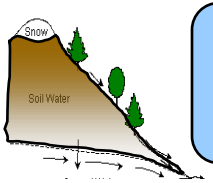
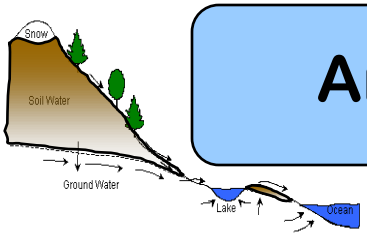


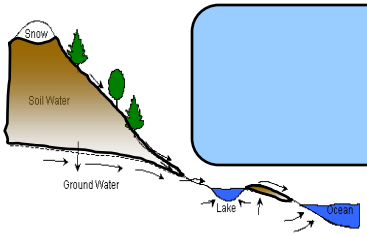
LMWG progress towards CLM4
Goal: complete by CCSM workshop; evaluate impact on CLM-CN

- Soil hydrology
  - soil moisture variability problem; interim solution
- Snow model: snow cover fraction, snow burial fraction, snow age, vertically resolved heating, aerosol deposition
  - done; tuning albedos through snow age params; minor changes in CAM required to pass aerosols to land
- Organic soil / deeper soil column
- Fine mesh – high resolution land and downscaling
- Minor changes:
  - roughness length sparse/dense canopy
  - CCSM stability function
  - reference height
  - energy imbalance where snow capping is active – introduce ice stream



Analysis of complete physics changes package

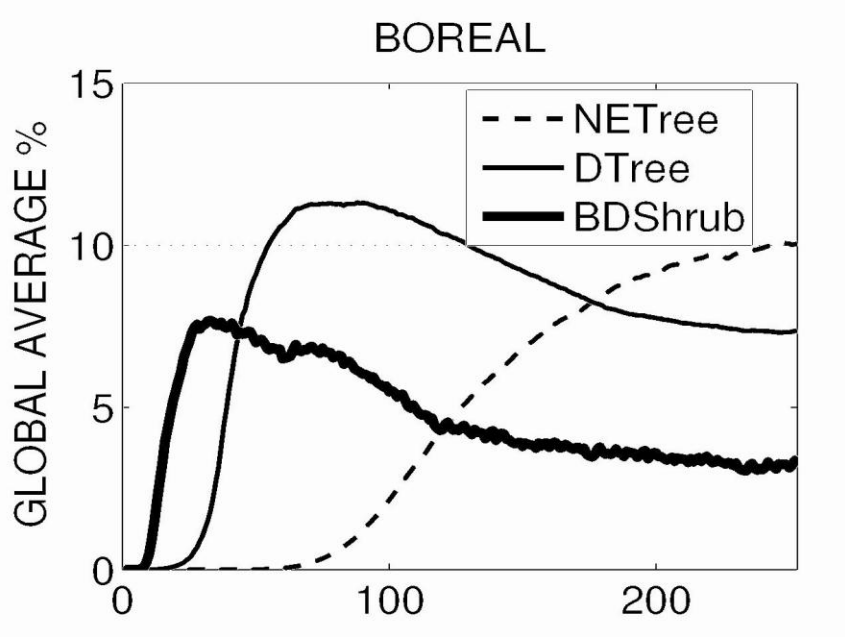
- **Offline**
  - CN generally looking better; e.g. cooler soils in high lats reducing overproduction
  - too much runoff globally
  - problem with offline forcing dataset, losing some solar radiation
- **Coupled to CAM**
  - too warm in summer
  - snow albedos too high with SNICAR?

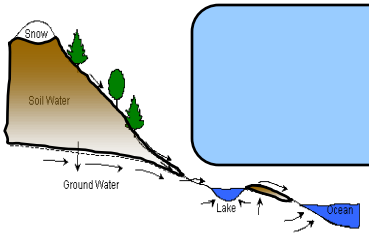


LMWG progress towards CLM4
Software engineering and tuning phase

- **Urban model**
  - implemented onto CLM trunk, initial global datasets complete; restarts, testing still required
- **Integration of CLM-CN with CLM-DGVM; CLM-CNDV**
  - Mostly complete, work needed to make DGVM work with prescribed land-use change
- **Shrub vegetation type in DGVM**
  - done; tuning may be required

GPP reasonable in CNDV



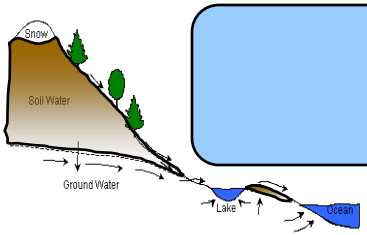


LMWG progress towards CLM4

- Soil hydrology – soil moisture variability problem
- Snow model changes – tuning snow albedo w/ snow age
- Organic soil / deeper soil column
- Roughness length sparse/dense canopy; CCSM stability function; reference height; energy imbalance
- Fine mesh – high resolution land and downscaling

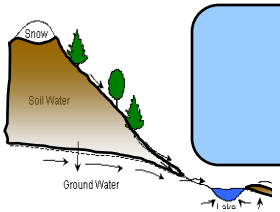
software engineering

- Urban model
- Integration of CLM-CN with CLM-DGVM
- Shrub vegetation type in DGVM
- Ice sheet model
- Prognostic canopy airspace
- Irrigation
- Integrated global crop model
- Dynamic wetlands

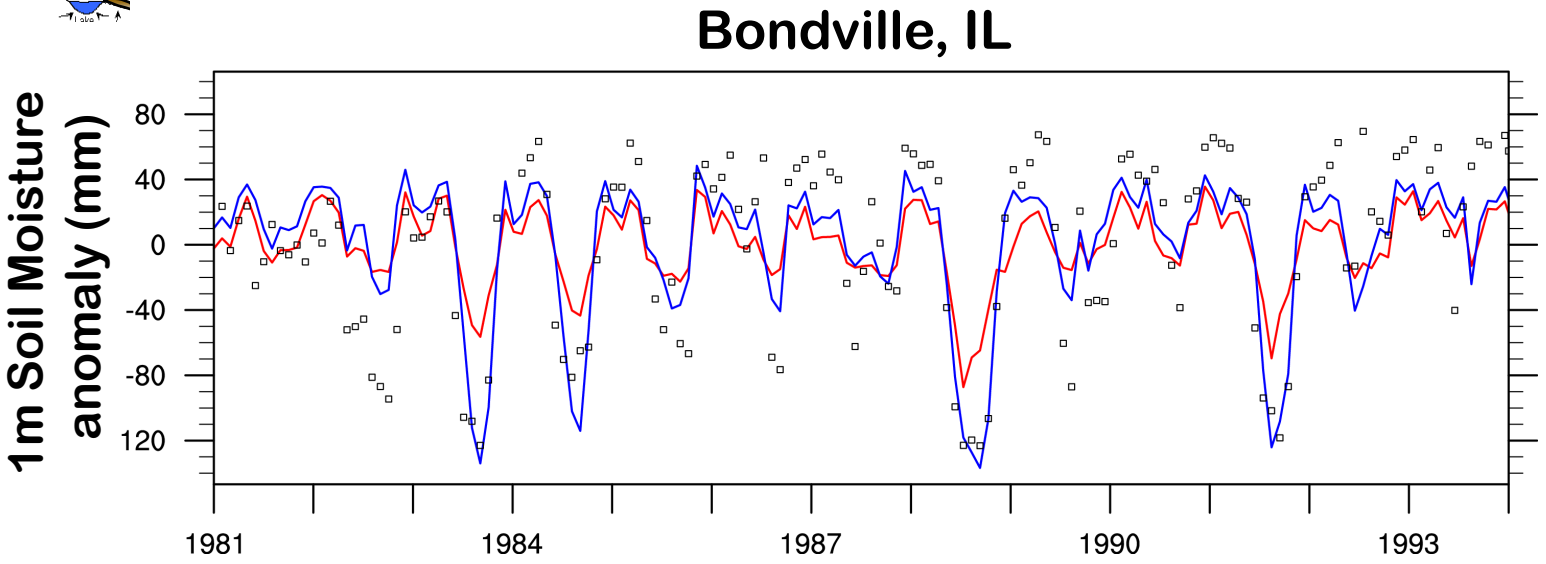


Ice sheet model

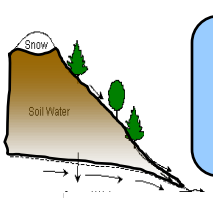
- CLM physics changes mostly complete
- developing elevation classes dataset; add sixth CLM land unit – glacier_mec (multiple elevation classes)
- coupling between CLM and GLIMMER
  - One-way coupling: ice sheet evolves dynamically, land topography fixed; might be ok for century-scale
  - Two-way coupling: CLM topography evolves; fraction, elevation, and thickness of ice in each elevation class are periodically updated using information from GLIMMER
- new ice stream for energy imbalance problem; killing two birds? use this for glacier calving?
- Mariana has agreed to assign Tony Craig to project starting late July; meeting on Tuesday night to outline a work plan
- Bill is working with Lawrence and Haiyan to start some test runs at ORNL to see whether the elevation classes solution gives reasonable mass balance



Soil moisture variability



- 19 Illinois stations, 1981-2004
  - Median $\sigma_{model} / \sigma_{obs}$: 0.44 → 0.72
- Rooting zone soil moisture variability increased globally
- Appears to alleviate vegetation overproductivity of mid-latitude FLUXNET sites in CN mode?
- Recover seasonal soil moisture stress → impact on variability of surface turbulent fluxes



LMWG progress towards CLM4
Unlikely

- **Prognostic canopy airspace** – improves computational efficiency, storage of heat, moisture, carbon in plant canopy
  - **Status:** abandoned
- **Integrated global crop model**
  - **Status:** Development
- **Irrigation**
  - **Status:** preliminary algorithm tested, a number of practical and scientific issues need to be resolved