

CMDV - LAND

W.J. Riley¹

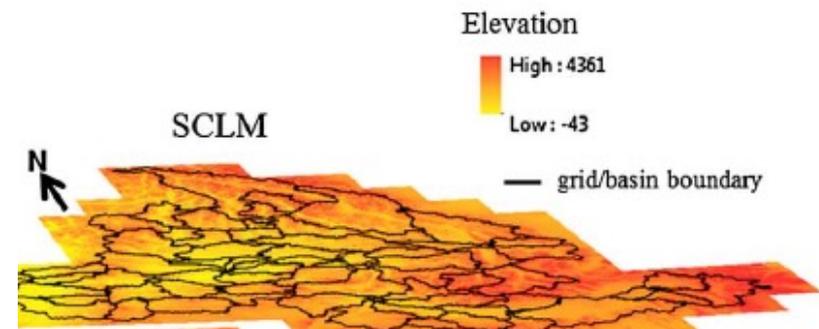
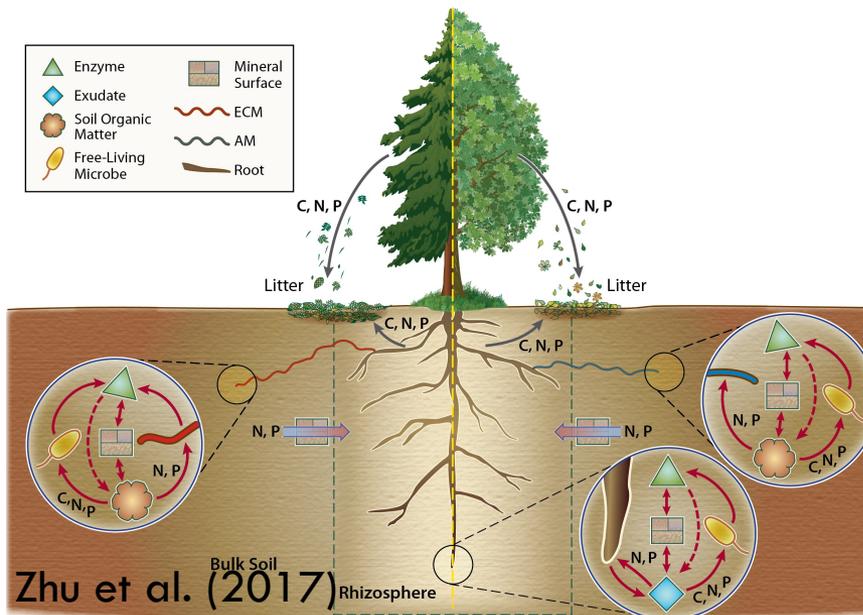
Jennifer Holm¹, Ryan Knox¹, Teklu Tesfa², Gangsheng Wang³

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LBNL¹, PNNL², ORNL³

Goals

- To facilitate interactions and collaboration on land surface model development activities among NGEE–Arctic, NGEE–Tropics, and ACME/ALM
- Enable process model developments tested within the NGEEs to be more rapidly applied in ACME and ALM
- ALM innovations can be more readily accessible to the NGEEs



Tesfa et al. (2014)

Liaison Positions

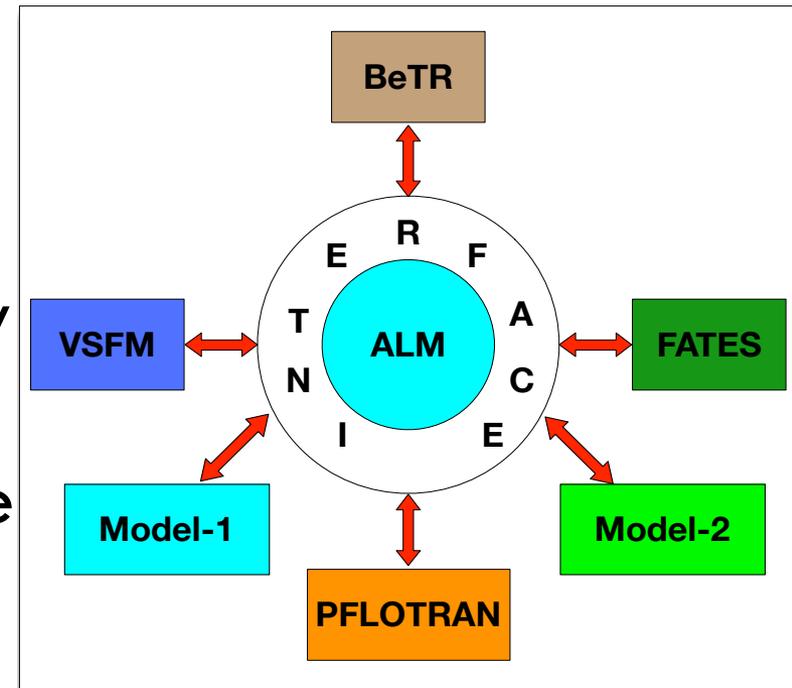
- Four 0.5 FTE liaison positions
 - Software engineer positions:
 - Hydrologic model developments (T. Tesfa, PNNL)
 - Vegetation model developments (R. Knox, LBNL)
 - Scientist developer positions
 - Biogeochemistry and thermal-hydrology (G. Wang, ORNL)
 - Global vegetation dynamics (J. Holm, LBNL)
- Detailed guidance for communication across projects, timelines, and development and software tasks
- The CMDV liaisons are working closely with the ALM land software engineer (G. Bisht) to ensure efficient coupling strategies and code and methods sharing

Activities

- Group is meeting regularly
- Designing common interface for components:
 - ▣ FATES ecosystem demography
 - ▣ PFLOTRAN thermal & hydrology
 - ▣ BeTR reactive transport
 - ▣ VSFM hydrology & thermal
 - ▣ New models as they become available
- Analyses with improved ALM
- Maintain timeline for development across efforts

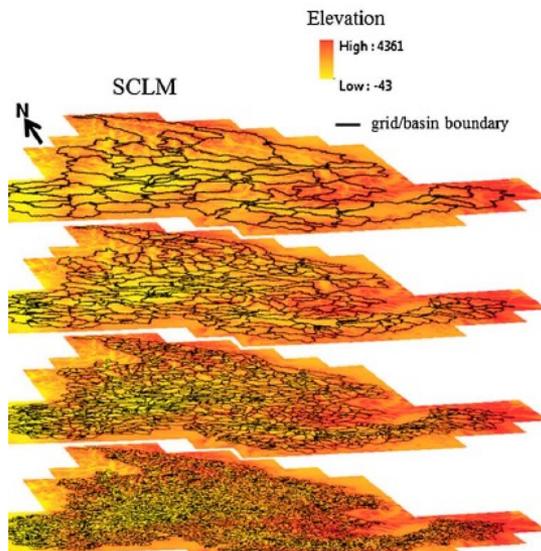
Design requirements for EMI

1. Couple ALM with multiple external models (e.g., FATES, PFLOTRAN, BeTR, VSFM, ...).
2. Ability to exchange data at ALM's various subgrid hierarchy structure (G/T/L/C/P – level).
3. Ability to call an external mode multiple times within a single ALM time integration loop.
4. I/O support of data from external models.

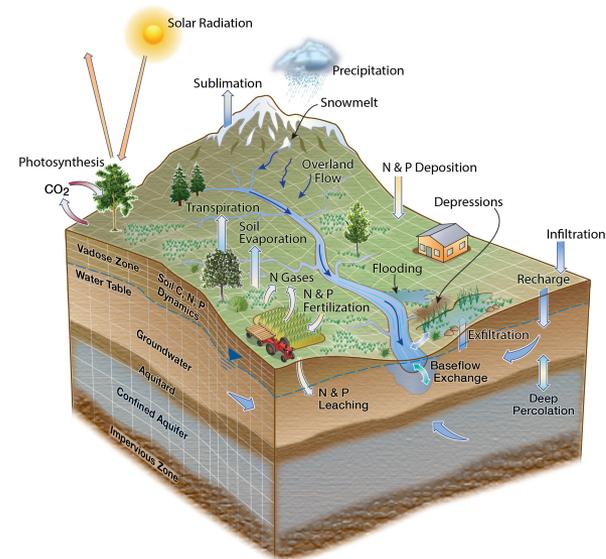


S/W Engineer for Hydrology (Teklu)

- Implement designs for explicit and subgrid spatial structures
- Assist with implementing new hydrological parameterizations (e.g., preferential flow)
- Assist with interface design for thermal, hydrology, vegetation, and subsurface BGC modules
- Support testing and evaluating hydrological approaches
- Define and adopt “best practices” for s/w engineering

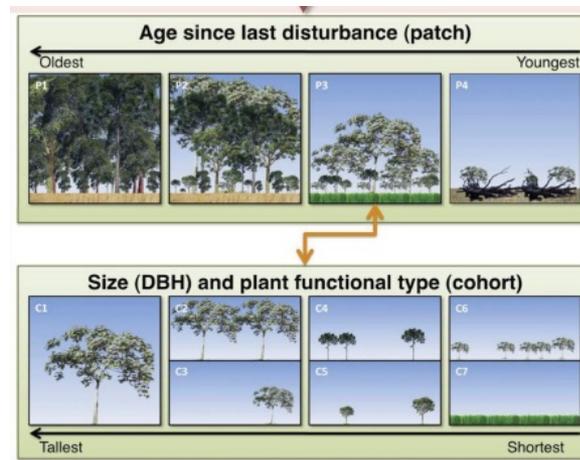


Tesfa et al. (2014)



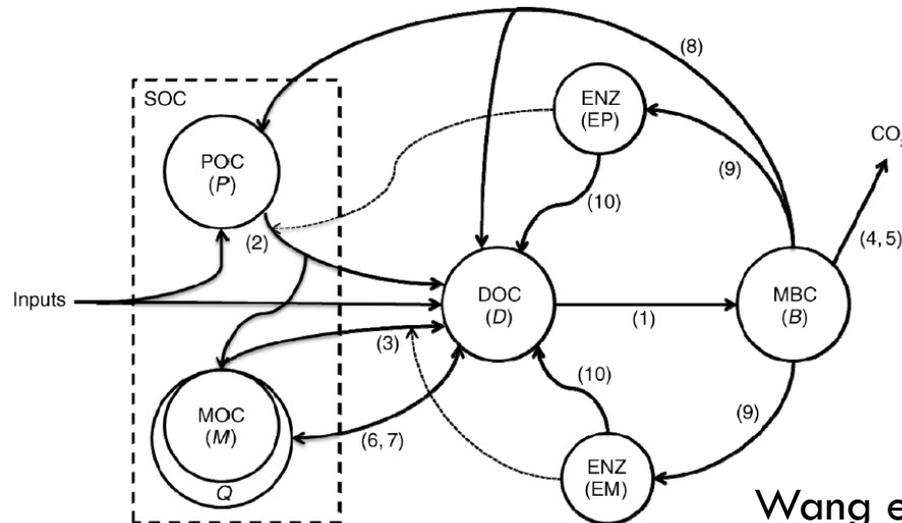
S/W Engineer for Dynamic Vegetation (Ryan)

- Increase ACME and FATES modularity and build and maintain interfaces
- Integrate and test model developments in FATES that are funded by NGEE-Arctic, NGEE-Tropics, ACME, and other TES lab and university projects
- Couple BGC, nutrient competition, and plant hydraulics into FATES for global application
- Define and adopt “best practices” for s/w engineering



Developer for NGEA-Arctic Efforts (Gangsheng)

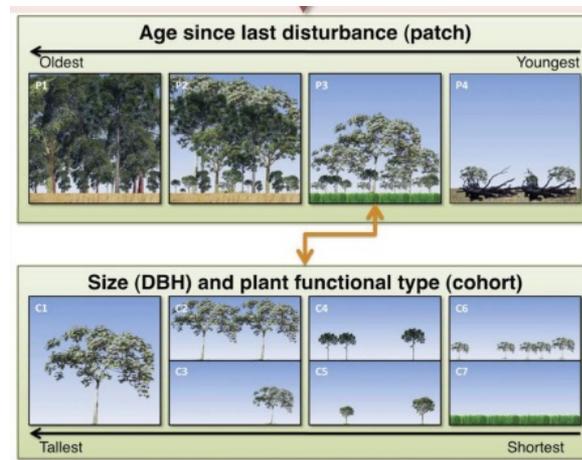
- Define science requirements for
 - ▣ PFLOTRAN implementation and integration with vegetation components
- Develop a microbe-explicit BGC module
- Implement global PFLOTRAN



Wang et al. 2013

Developer for Dynamic Vegetation (Jennifer)

- Develop extra-tropical vegetation parameters and structures in FATES
- Develop vegetation demography components
- Integrate land benchmarks for demography and dynamic vegetation into ILAMB, evaluate ALM-FATES
- Test within ALM-FATES emergent biogeographic and demographic patterns
- Perform numerical experiments with ALM-FATES



Summary

- Good progress on interface design for four current and future modules
- Regular calls within group progressing well
- Ongoing productive interactions with ALM software engineering

