Evaluating modeled carbon state and flux variables against multiple NACP observational datasets

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Soil Mineral N

N Immobilization

C-N Coupling Schematic

Photosynthesis

Potential GPP sets N demand

Plants and microbes compete for N on basis of relative demand

GPP downregulated by N supply

Plant N uptake

N Mineralization

N Miniration
CLM-CN, GPP
Multi-site comparison
Mid-summer mean diurnal cycle

---  Obs  ---  ---  Model  ---
Original model: no plant N storage pool

Soil mineral N \rightarrow \text{mineralization} \rightarrow \text{Pre-allocation \( \propto \) plant N storage pool} \rightarrow \text{Plant allocated N} \rightarrow \text{immob.}

Revised model: plant N storage pool

N to storage \( \propto \) (demand, availability)

N from storage \( \propto \) (demand, storage)

Soil mineral N \rightarrow \text{mineralization} \rightarrow \text{Pre-allocation \( \propto \) plant N storage pool} \rightarrow \text{Plant allocated N} \rightarrow \text{immob.}
This approach works to some extent at all sites…

Best example: University of Michigan Biological Station (US-UMB)
...but at many sites there is still a significant bias in the seasonal cycle of GPP, Re, and NEE

Typical example is the Old Aspen site (CA-Oas)
Next steps:

• Exploring additional modifications to the N storage pool algorithm to improve late-season N availability.

• Depth-resolved soil organic matter may play an important role in setting the seasonal cycle of Re and N availability in colder climates, which would influence GPP and NEE.