Capturing functional strategies and compositional dynamics in FATES

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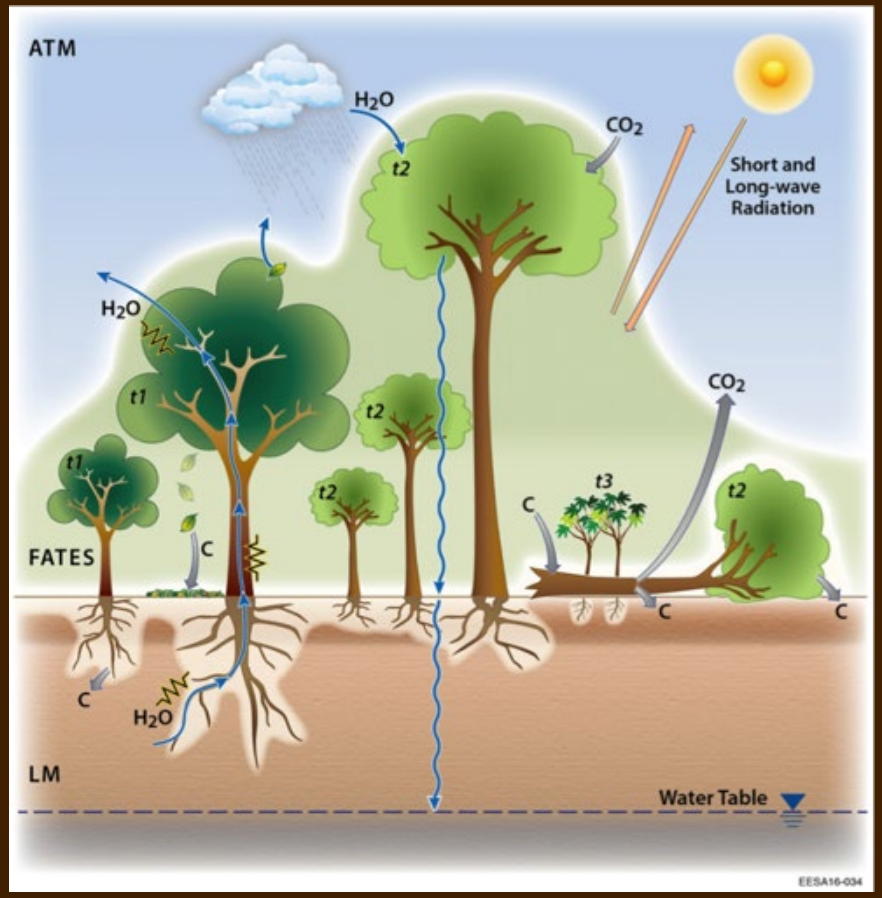
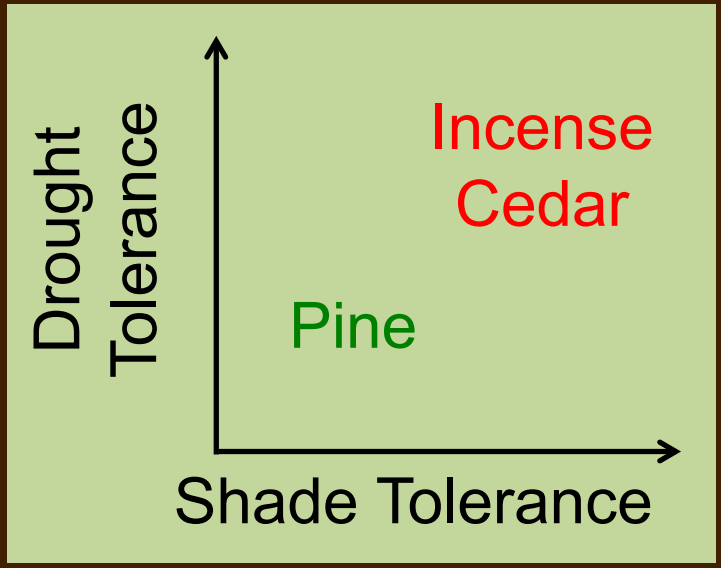


Light, water, and fire exert important controls in the Sierra Nevada mixed conifer forest



Our Approach to PFT Definition

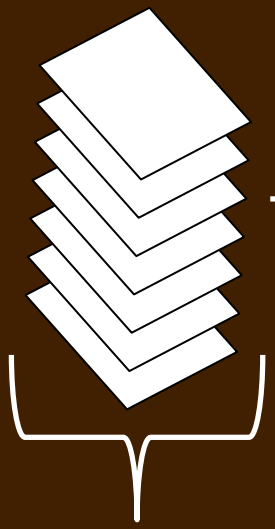
1. Parameter sensitivity analysis

1. Define pine and incense cedar PFTs at a single site

1. Benchmark forest composition across a climate gradient

1. Investigate model biases

Creating PFT Definitions



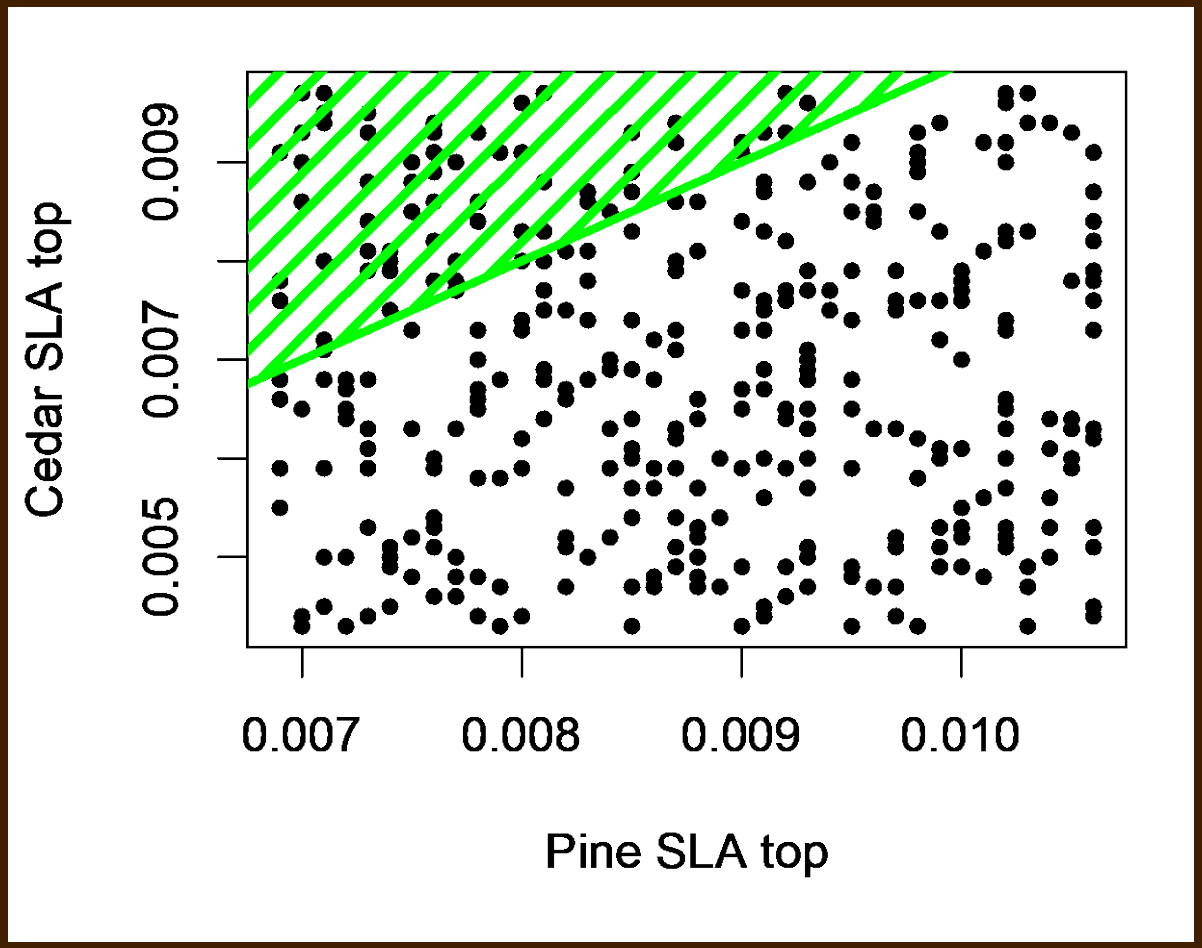
360-member ensemble of parameterizations

Fire On
Fire Off
x
Bare Ground
Initialized

Filtered by ecological expectations

Retained PFT definitions

Constraining relative PFT trait values is critical



SLA
Vc max
Leaf Longevity
Leaf N
Wood Density
SMPSC
Bark Thickness

Filtering Parameterizations

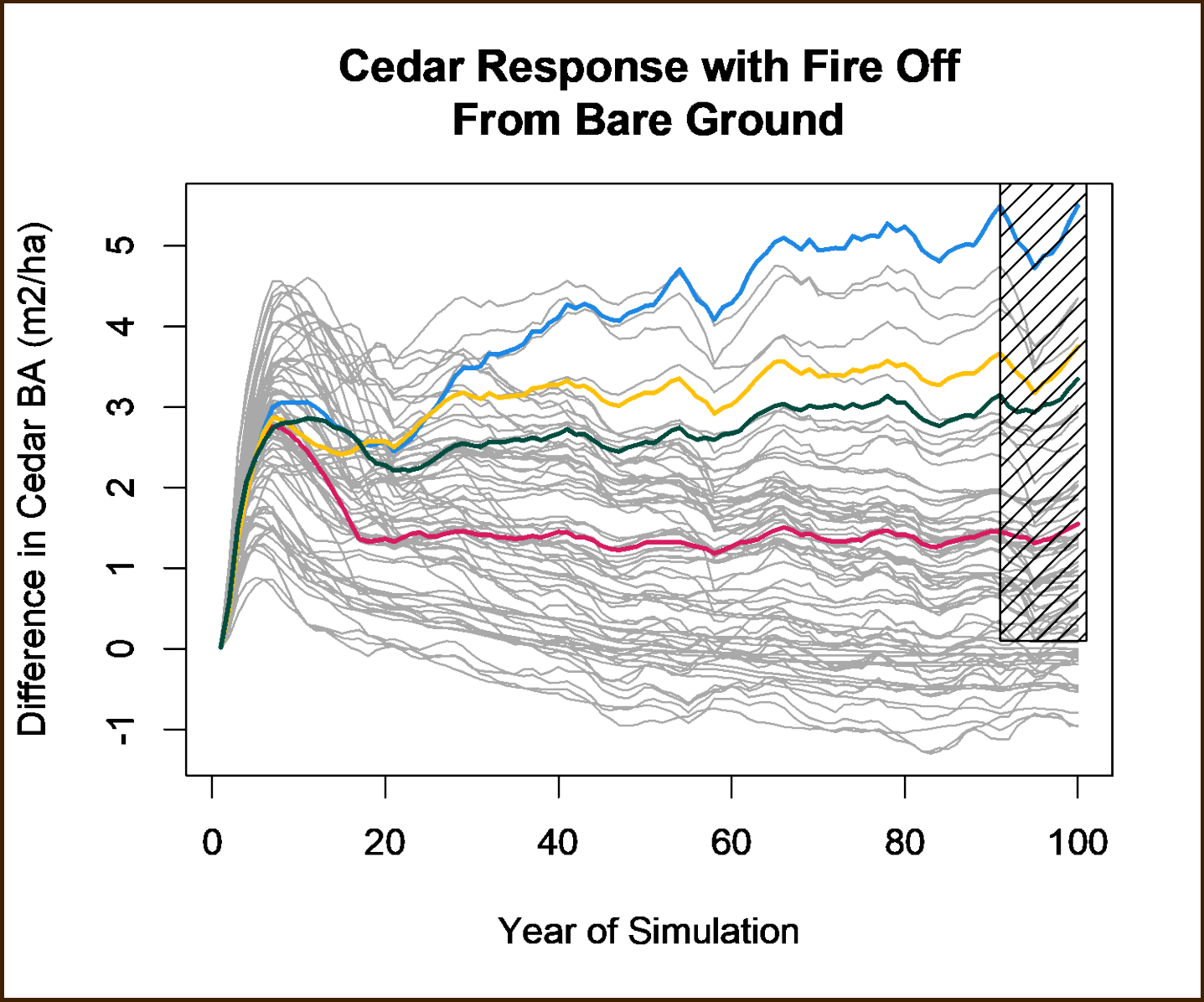
Fire Active

Fire Inactive

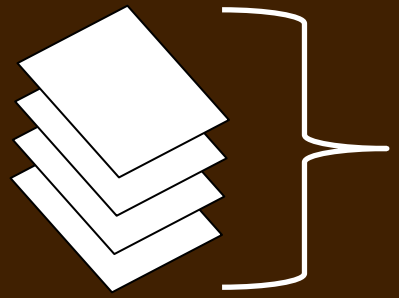
Other filters:

- Both PFTs persisted
- Carbon Use Efficiency
- Leaf Area Index

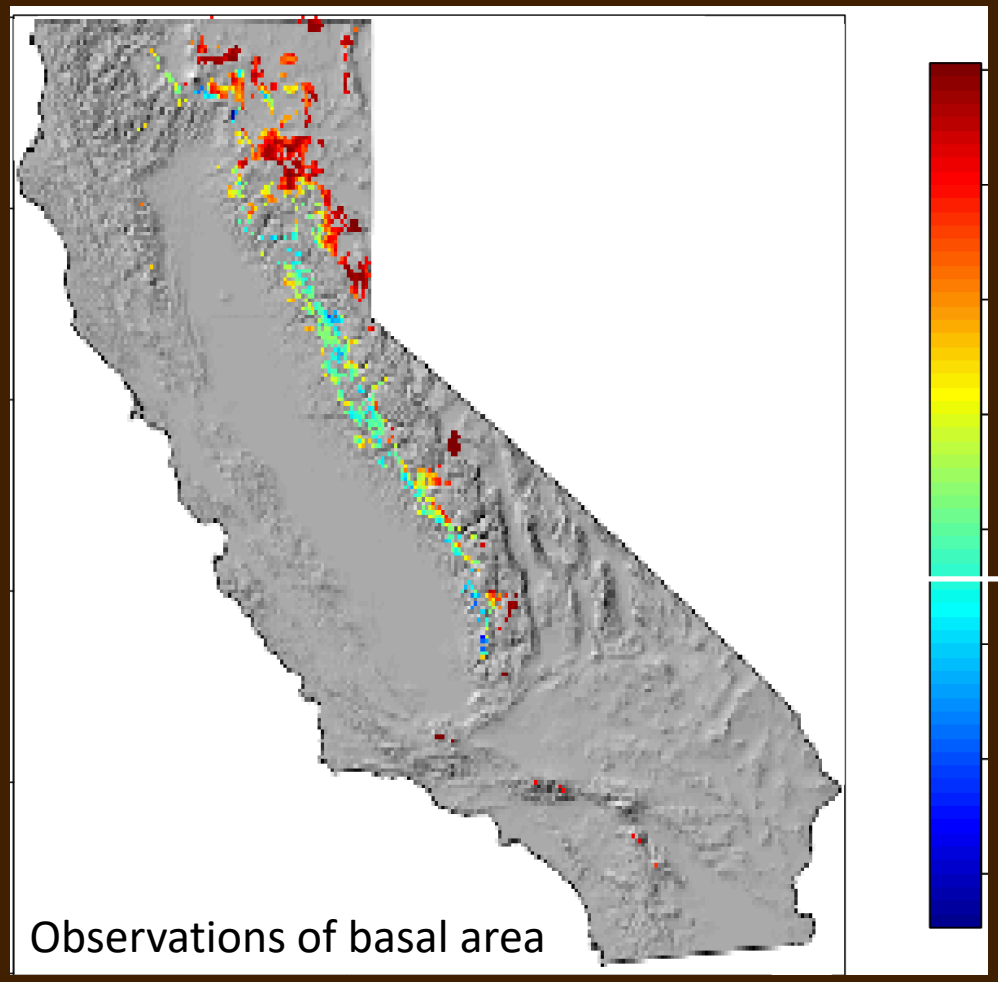
Filtering retains plausible PFT definitions



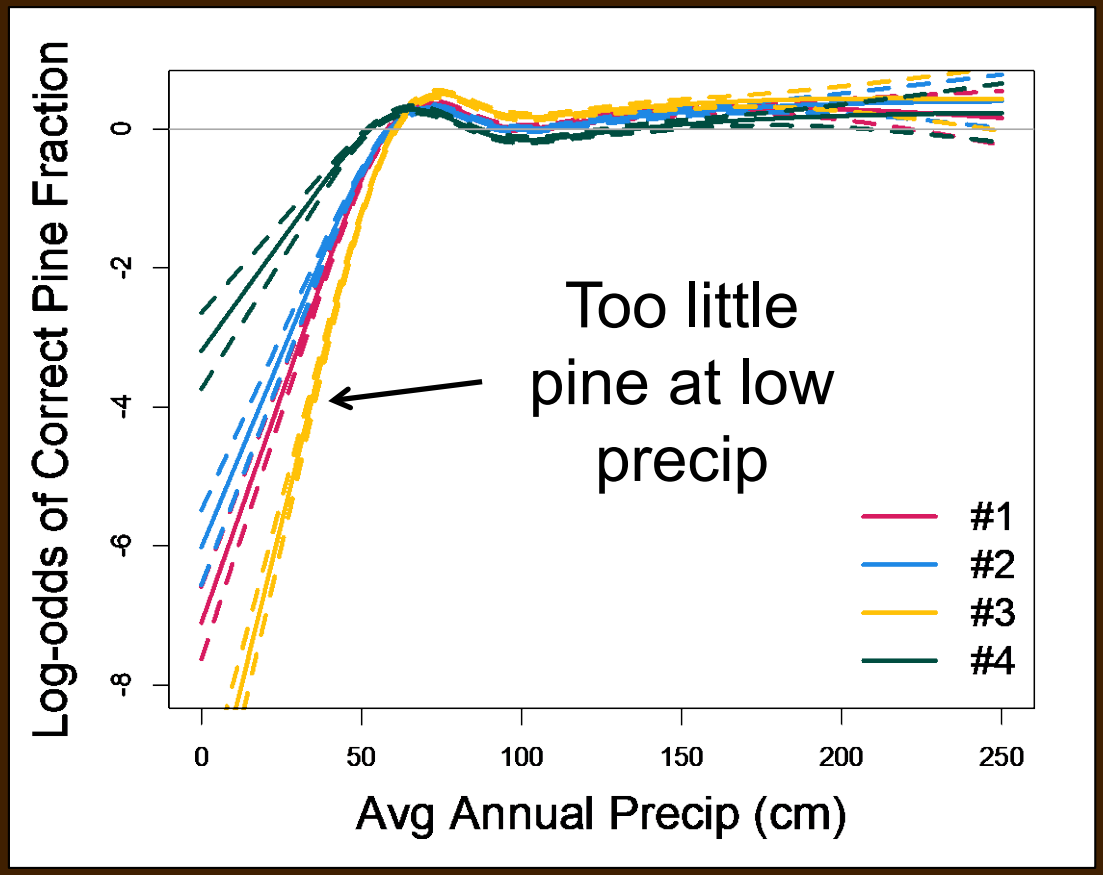
We ran a regional ensemble of four parameterizations to benchmark composition and identify model biases



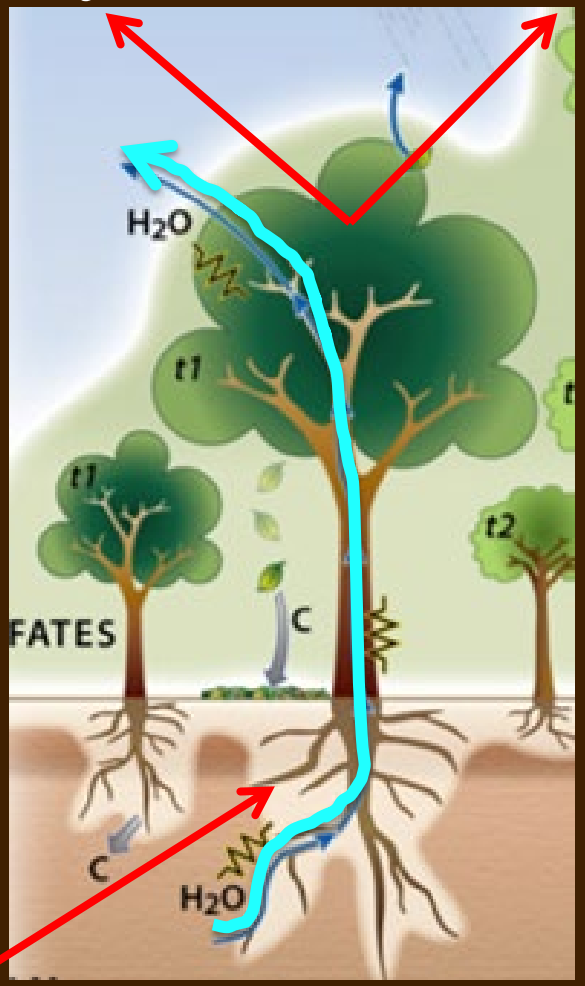
Retained Pine and Cedar Parameterizations



Model biases indicate deficiencies in parameterizations or processes representation



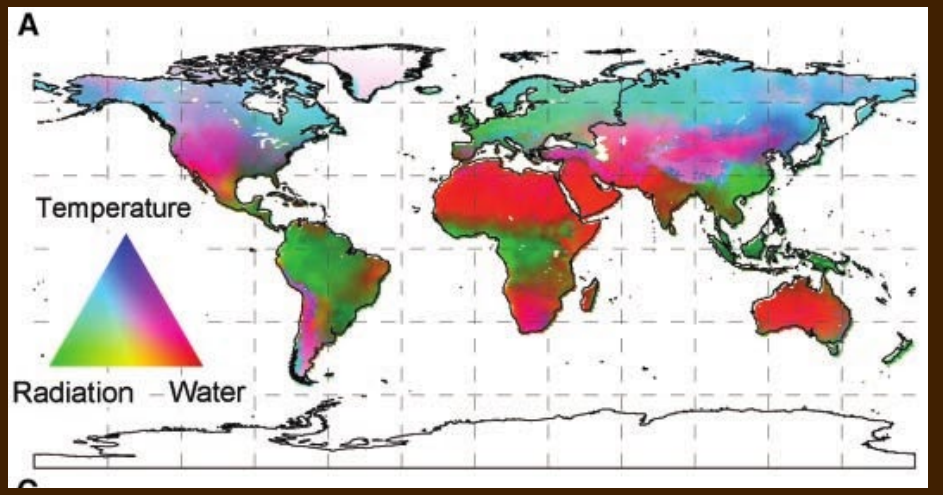
Dry Pine Mesic Pine



Rooting distributions
Soil definitions

Potential application at the global scale

1. Sites selected to represent:
   - Coexistence
   - Competitive Exclusion



Nemani et al., 2003. Science

2. Sensitivity Analysis

3. Filter with appropriate ecological expectations

4. Small domains to benchmark retained parameterizations across climate/soils gradients

5. Global simulations with retained parameterizations

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