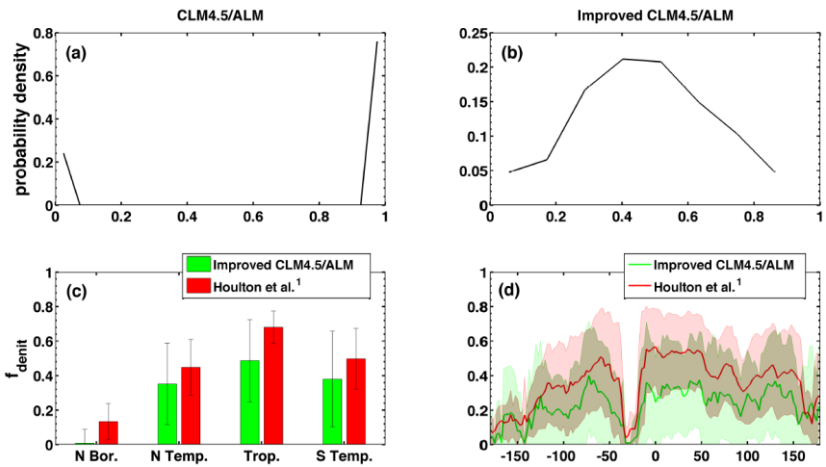
Improved Modeling of Soil Nitrogen Loss

Objective:

- Improve prediction of soil nitrogen losses via advection (i.e., nitrate) and gaseous emissions (i.e., N_2O and N_2).
- Improve the ACME Land Model (ALM) numerical representation of nutrient competition coupled with abiotic processes.



Approach:

- We modified the ALM nitrogen competition module with the Equilibrium Chemistry Approximation (ECA) approach that represents the multi-substrate, multi-consumer environment
- Advective nitrate losses and competition with biotic consumers (e.g., plants) were more realistically represented.

Results/Impacts:

- As shown in the upper left panel, the current versions of ALM and CLM4.5 poorly represent the gaseous proportion on nitrogen losses (f_{denit}).
- The bottom two panels show the dramatic improvements in partitioning of N losses with our ECA and advection changes.
- We are integrating these concepts into ALMv1.

Zhu, Q., and **W. J. Riley** (2015), Improved modelling of soil nitrogen losses, *Nature Clim. Change*, 5(8):705–706, doi:10.1038/nclimate2696.