Unified Two-Plume Convection Scheme with Organization in CAM5

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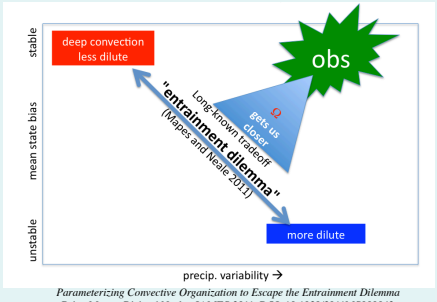
Why an Organization (Ω) scheme?

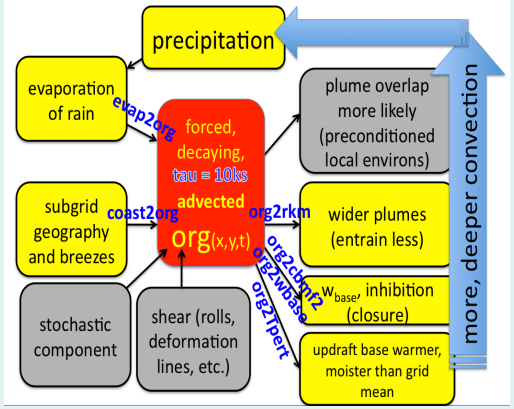
Lateral mixing rate in convection is the most sensitive parameter in GCMs. But there is no true optimum value, just an unwanted tradeoff between mean bias vs. too-weak convective variability. The idea was to get off that treadmill, by having *initial* convection restrained by strong entrainment, but *mature* (or organized) convective cells more protected, as seems to occur in nature.



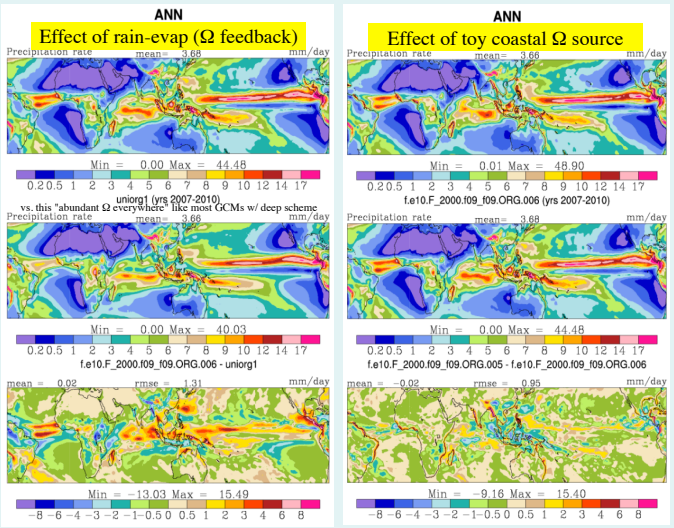
Parameterizing Convective Organization to Escape the Entrainment Dilemma
Brian Mapes, Richard Neale. JAMES 2011, DOI: 10.1029/2011MS000042

Concept of Organization Scheme

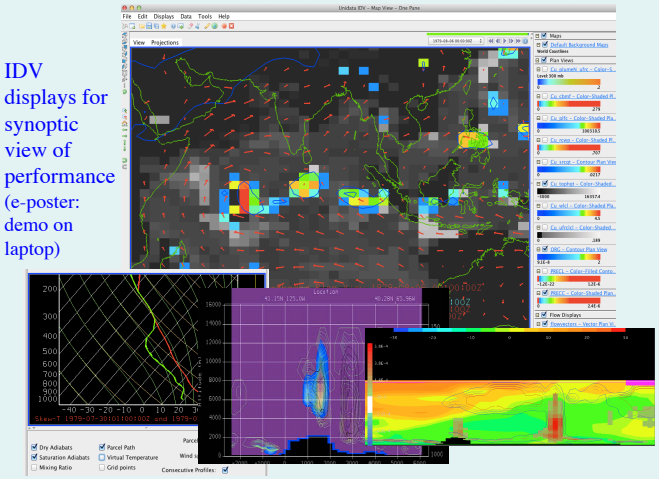
Controlled by coefficients xxx2org, org2yyy
A local positive feedback (once it organizes, it pours)



Global climate effects of rain-evap and coastal Ω sources.
The Park-Bretherton shallow scheme has a second plume with smaller mixing rate proportional to Ω.

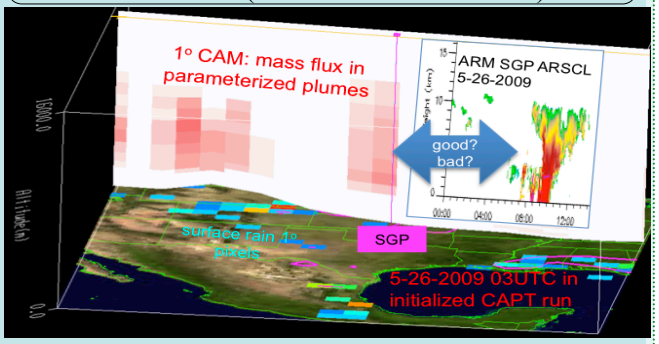


IDV displays for synoptic view of performance (e-poster: demo on laptop)



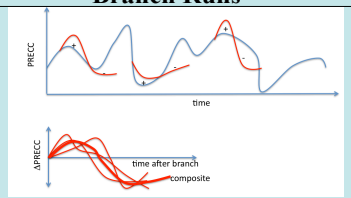
Can it be evaluated with observations?

CAPT runs (thanks to LLNL collabs)



To understand climate differences in terms of weather processes, and quickly glimpse sensitivities to parameters in terms of weather systems, without SCM too-smallness or CAPT initialization shock...

Branch Runs



Late stages of project. THANK YOU DOE/ARM/ASR!
CAM5-org-ens model code available upon request.
Fully compatible with CAM5/ CESM.
Publications in preparation.

1. Large scale impacts of geographical sources of organization in the Community Atmosphere Model with an organized plume ensemble convection scheme.

2. Understanding the climatological impacts of convective organization in a GCM through short term branch run differences.

3. Evaluating the accuracy of an organized plume ensemble convection scheme using GCM runs initialized and optionally nudged with reanalyses.