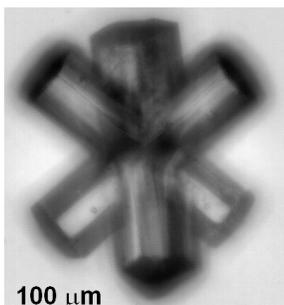


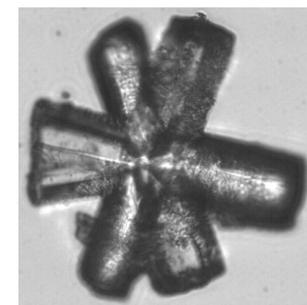
Physical Processes Team

**Six talks covering scales from
ice particle, individual cloud,
mesoscale convection system,
to global-scale precipitation**

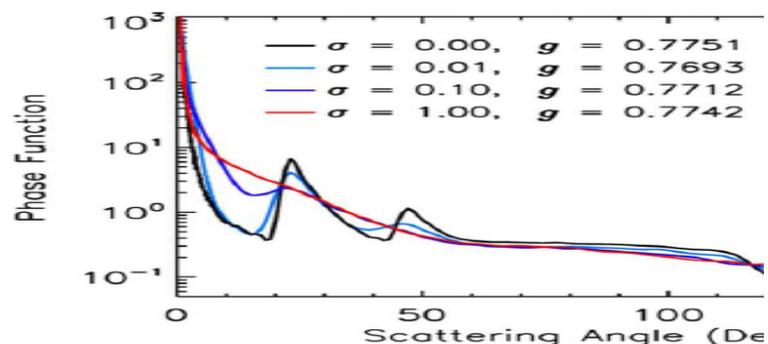


Ice Microphysics

Carl Schmitt



Surface roughness on ice crystals significantly impacts the cloud radiative properties.



Rough: g=0.63

Smooth: g=0.80

Surface roughness appears to be common in atmospheric clouds.

Measured phase functions by SID3 probe more frequently resemble phase function calculated for rough particles.

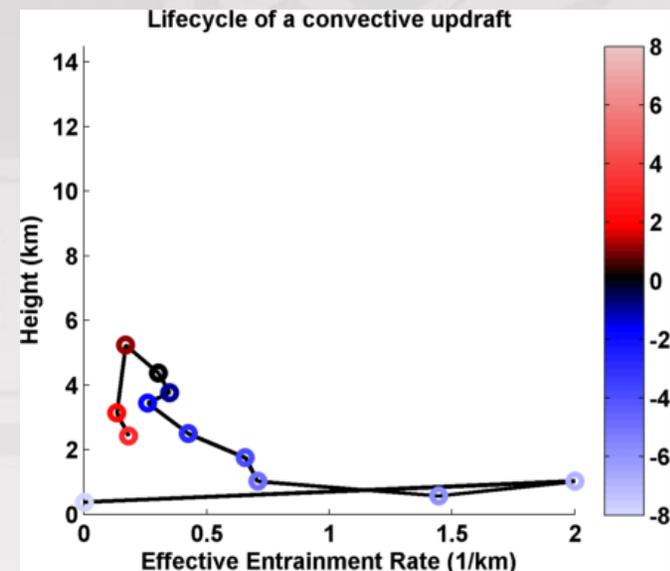
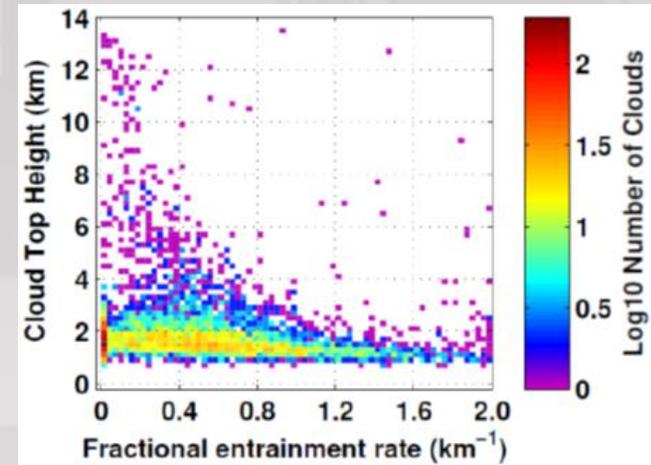
Laboratory experiments show that local conditions during ice particle growth appear to govern whether or not particles have surface roughness.

Supersaturation during re-growth period	Percent of particles with rough surfaces	Column and bullet rosette Hollowness
5%	20%	<5%
35%	85%	100%

The distribution of cloud top heights in tropical convection

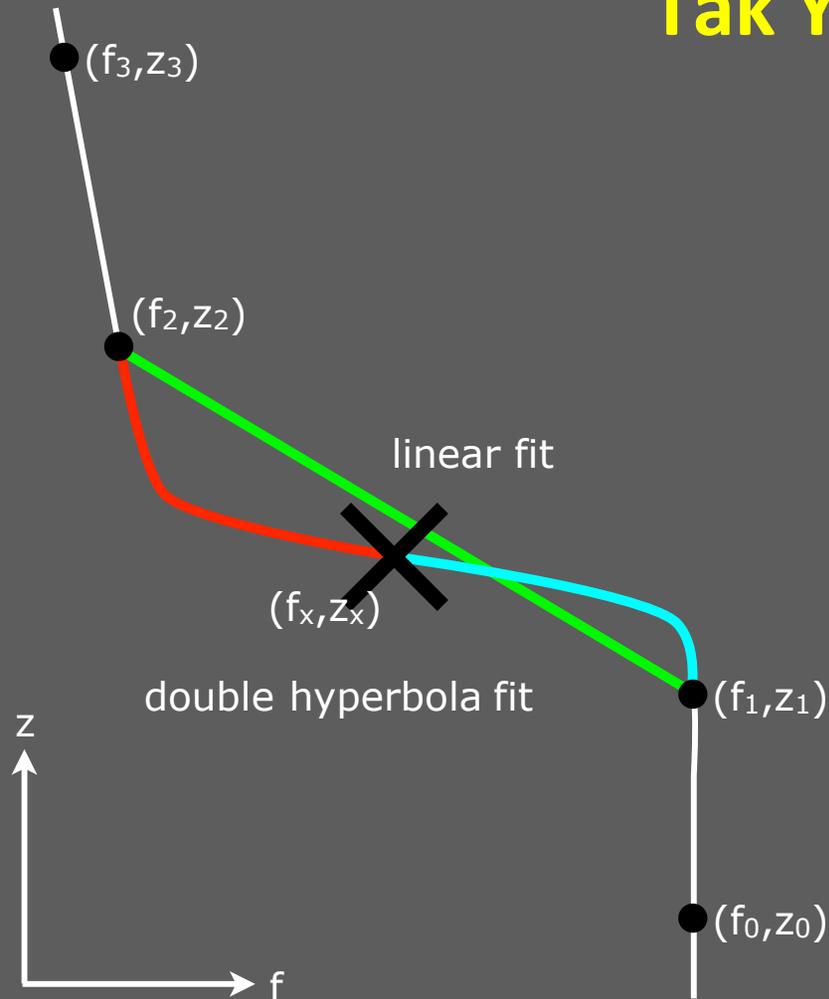
Compare variability between entrainment rate, cloud base area and vertical velocity, and lifecycle of cumulus updrafts for different cloud top heights

Ian Glenn
Steve Krueger



Alternative fit function

Tak Yamaguchi



- General form of hyperbola was considered and discarded. Too complicated.
- Rectangular hyperbola: $(z-h)(f-k)=m$
- m characterizes shape.
- h , k , & m can be obtained with 3 levels.
- Alternatively h & k can be obtained with m and 2 levels.
- Problems:
 - ▶ How to set f_x and z_x ?
 - ▶ How to set m_1 and m_2 ?
- GASS ASTEX Lagrangian (P. Blossey): SAM, LES, 40 hours, diurnal cycle

Robustness and sensitivities of Central U.S. summer convection in SP-CAM: Multi-model intercomparison with new regional EOF index

Gabriel J. Kooperman

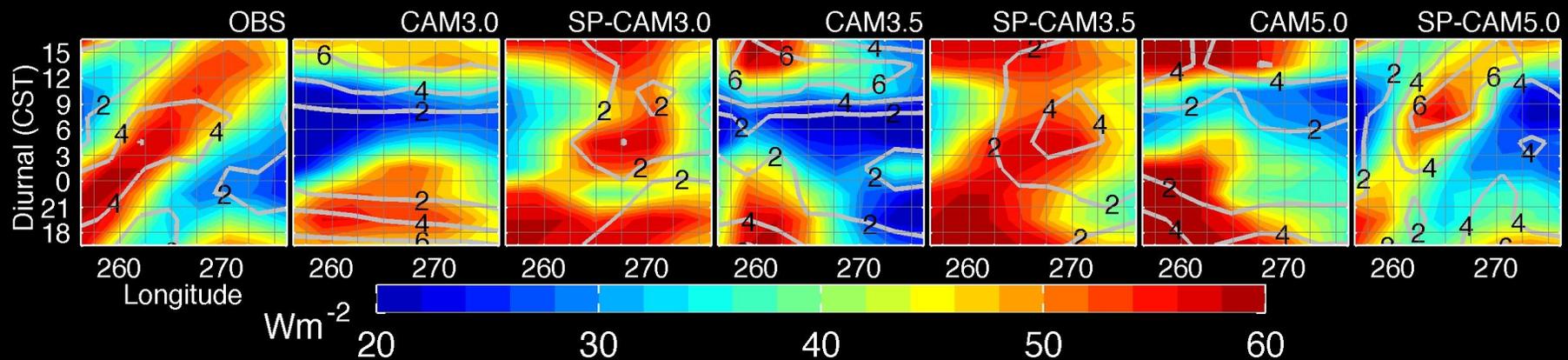
Michael S. Pritchard

Richard C. J. Somerville



GRL June 2013

Diurnal cycles of longwave cloud forcing (colors) and precipitation (contours) above an index threshold of 0.25



- New EOF index compactly evaluates the mid-latitude MCS signal.
- US MCS physics is a robust effect of super-parameterization.
- The signal is most realistic in 5.0 with two-moment microphysics.

SP-CAM5 with CLUBB: progress and remaining issues

Minghui Wang

Minghui, Steven Ghan, Mikhail Ovchinnikov, Heng Xiao – PNNL
Vincent Larson, David P. Schanen – Univ. Wisconsin – Milwaukee
Xiaohong Liu – Univ. Wyoming

- ▶ MMF-CLUBB with single-moment microphysics works reasonably well, and substantially increases low cloud amount and improves the simulation of shortwave cloud forcing in the subtropics
- ▶ MMF-CLUBB with Morrison microphysics increases low cloud amount. However, simulated clouds and aerosols show strong sensitivity to how CLUBB and Morrison scheme is coupled. Further work is needed to explore this coupling
- ▶ CLUBB's impact on low clouds and on aerosol-cloud-precipitation interactions will be further examined

Global Distribution of JJA Surface Precipitation

Anning Cheng

