Update on CAPT* activities

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*CCPP-ARM Parameterization Test bed

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Testing parameterizations

- Zhang control: CAPE based simplified Arakawa-Schubert scheme
- Zhang modified: new closure based on the CAPE change rate due to the large-scale forcing in the free troposphere
- Wu and Zhang: Zhang new closure + cumulus momentum transport
- Neale-Richter: Zhang control with a dilute CAPE + Richter cumulus momentum transport
- Liu/Ghan/Penner new ice scheme (MPACE)
- Expecting Morrison/Gettleman (MPACE)
- Bretherton PBL and shallow convection
- Welcome any new collaborations

New Model versions

- CAM3
  - FV 1.9 by 2.5
- GFDL
  - FV core 2 by 2.5

Test cases

- SGP summer 1997 all of 2000
- MPACE
- EPIC (October 2001)
- TOGA COARE
- TWP-ICE

Analyses used for initializing forecasts

- ERA-40
- GDAS (operational analysis)
- ECMWF operational analysis for (TWP-ICE)
- DAO

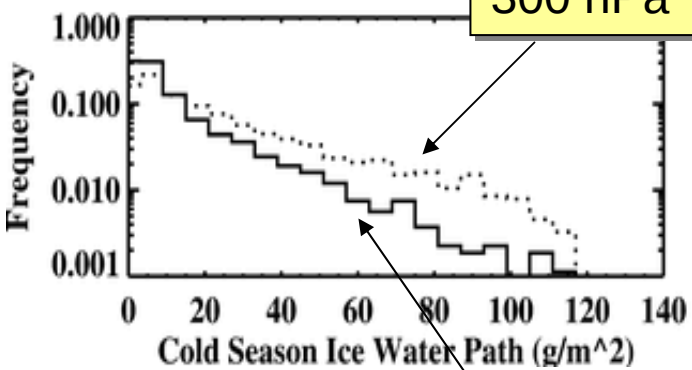
CAPT Data in archive -

- Standardized netcdf, cf compliant MOLT output from CAM3 and AM2
  - All ARM sites
- ISCCP, ISCCP simulator, vertical profiles, radiation, winds, clouds, etc.
  - 1 hr frequency matched to vertical resolution of variational analysis
  - Hour 12-36 of daily forecast put together as time series
  - Nearest point to observation
- Years -entire year of 2000, summer 1997 IOP
  - Plans to add more data
- See poster Mace and Dong as an example of data use

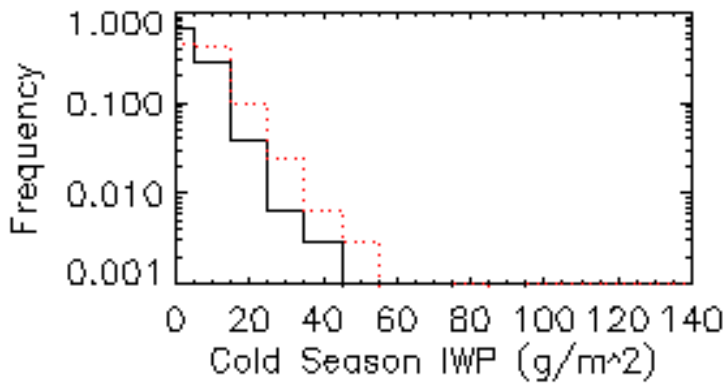
Mace-Hartsock SGP Ice Water Path histograms

M06 OBS

upward motion
300 hPa

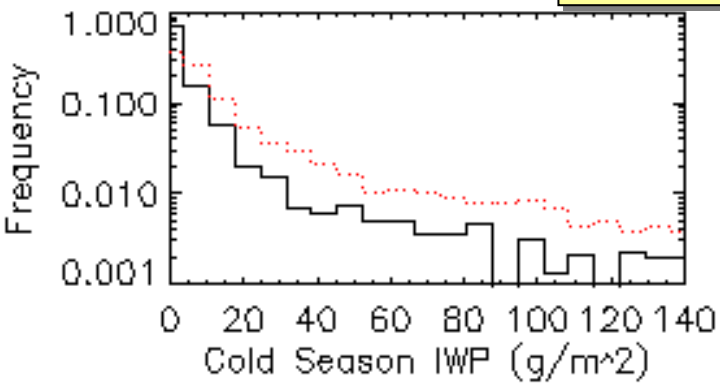


C-CAM3

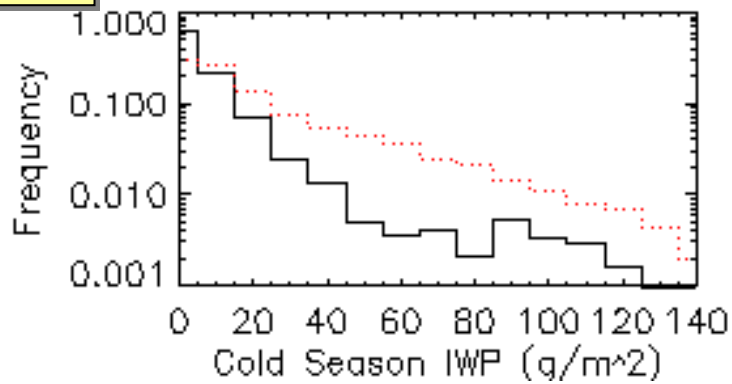


downward motion
300 hPa

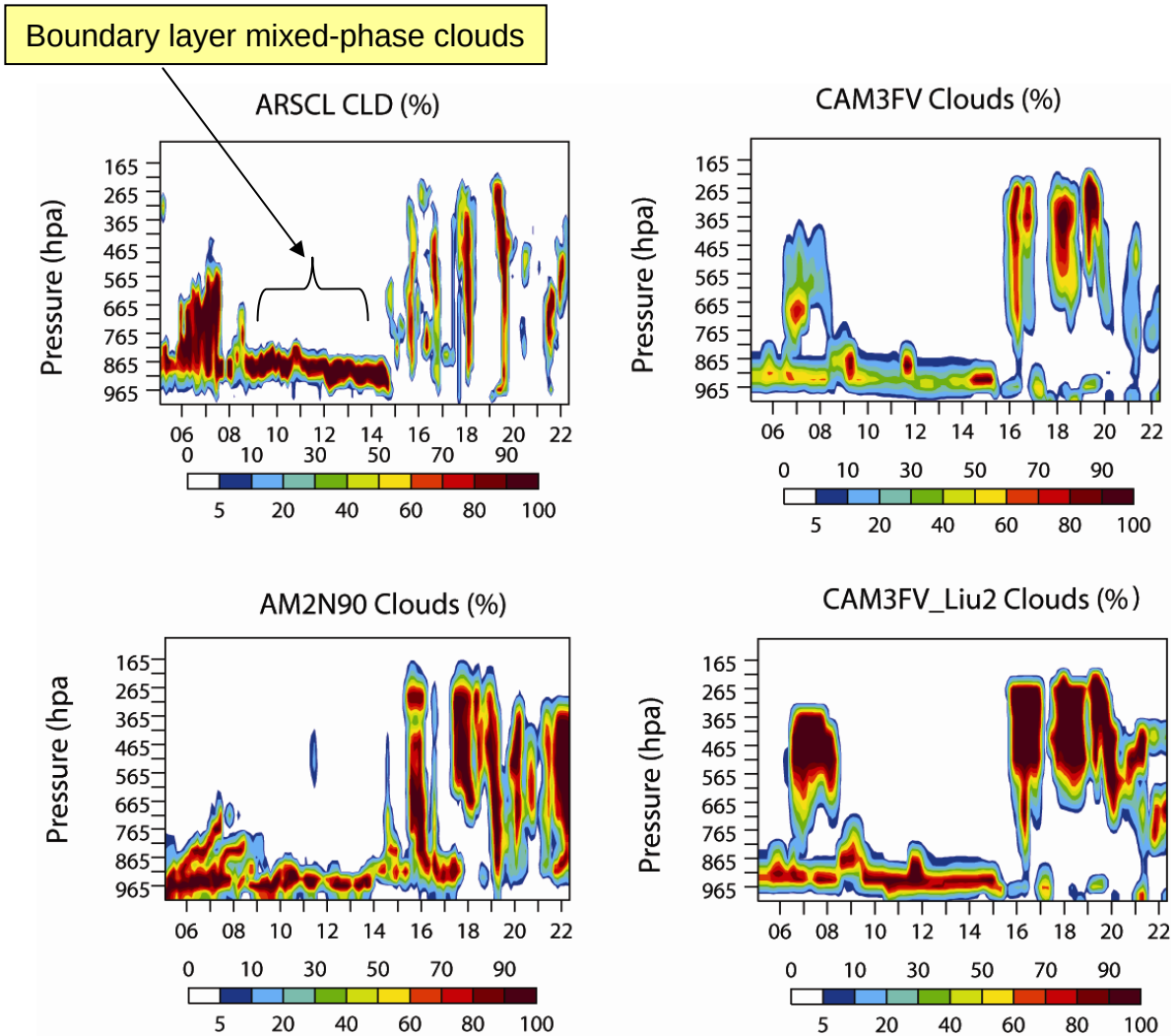
ECMWF



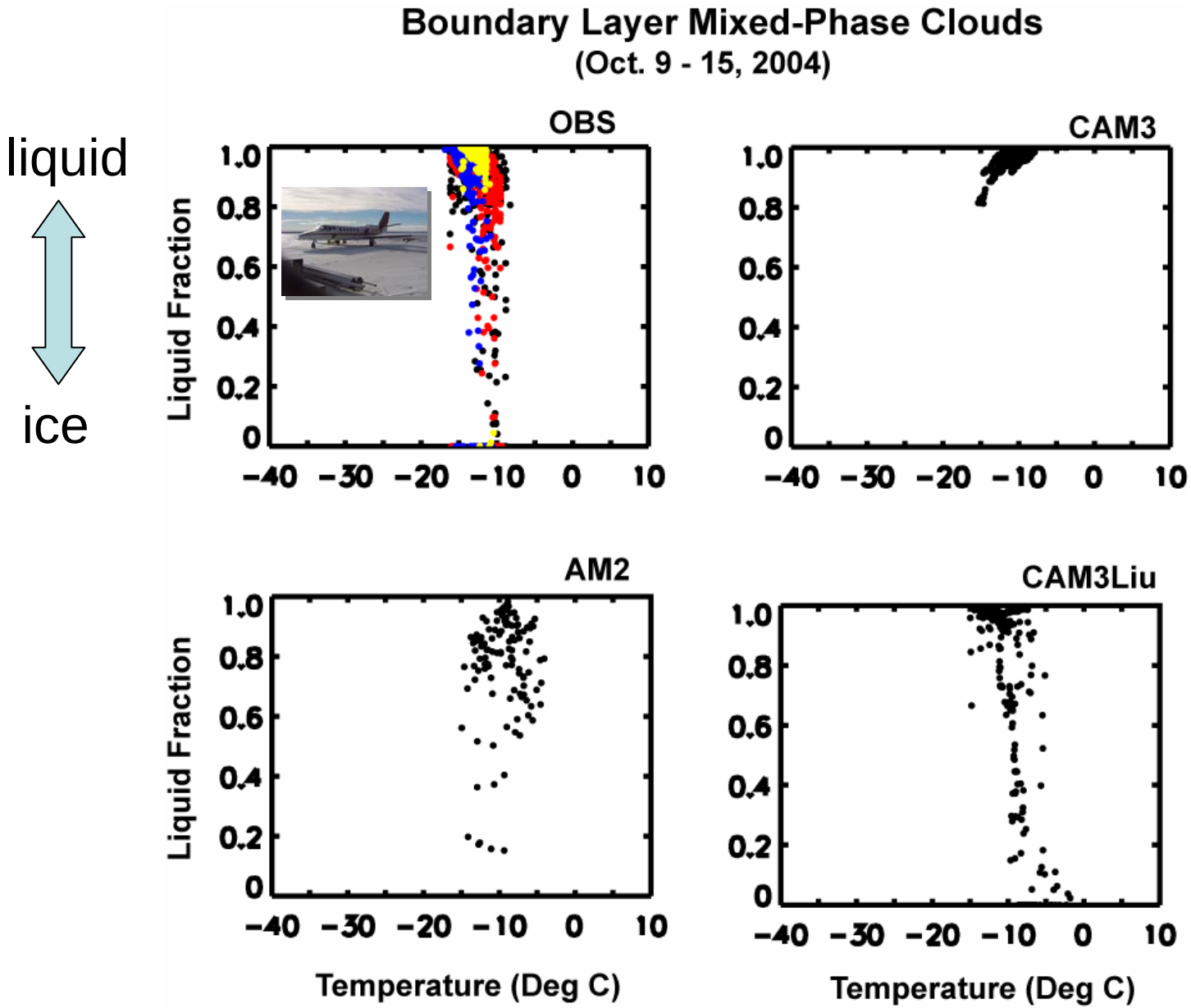
C-AM2



October 2004 MPACE cloud cover by height



Liquid fraction vs. Temp



TWP-ICE Selected results

- CAM3.2 finite volume core
- 3 day forecasts
  - Initialized by ECMWF operational analysis
  - Hour 24-48

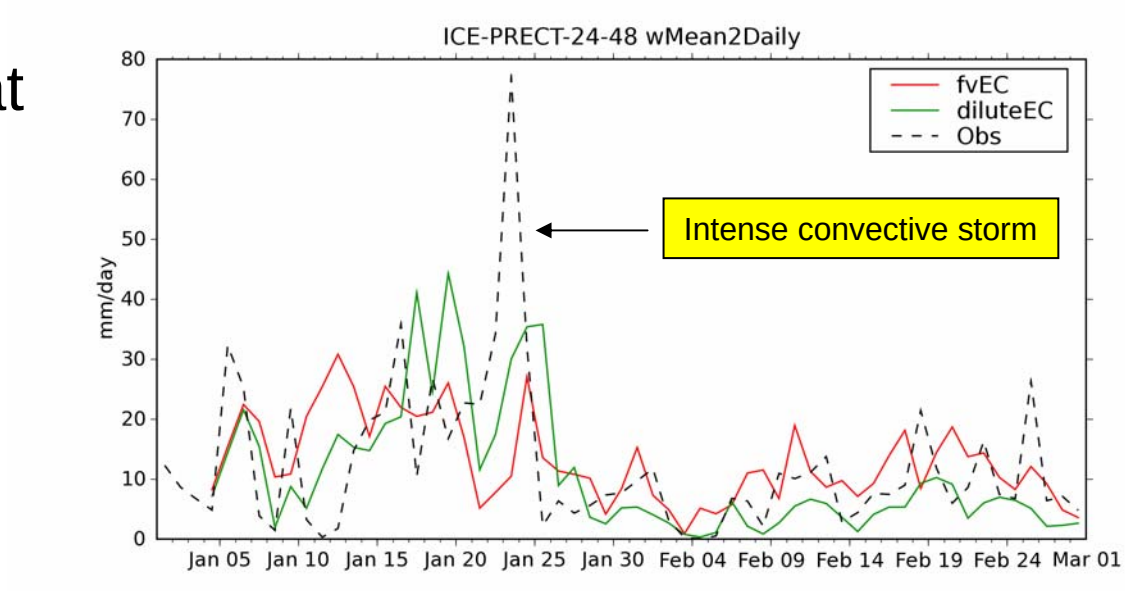
Daily average rainfall at the TWP-ICE

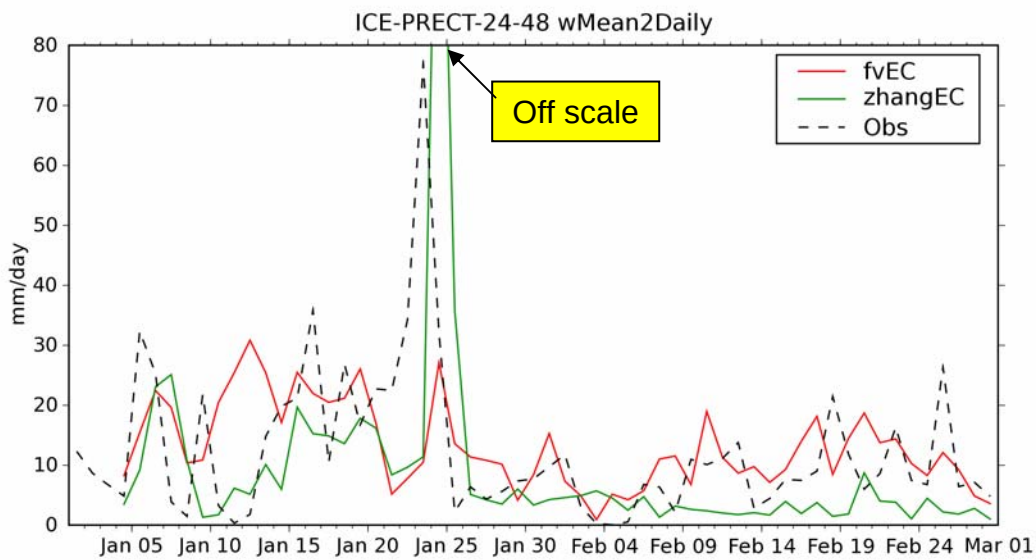
fv - control with original convective scheme

Neale (dilute) underestimates rain events during February

Observed are from radar and station data representative for the area within the TWP-ICE pentagon

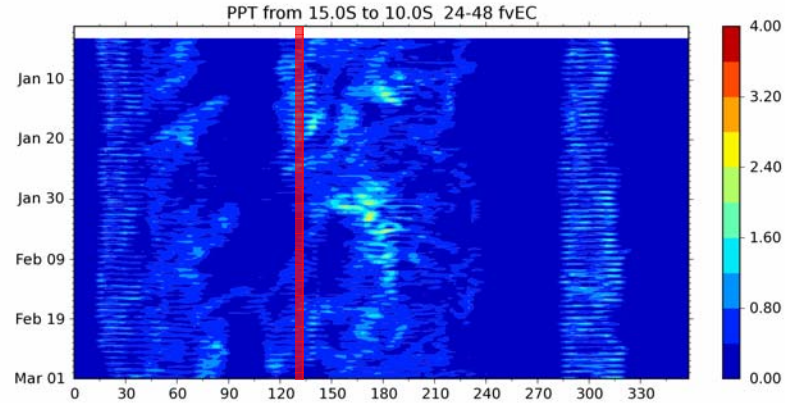
Zhang underestimates rain for the rest of the period

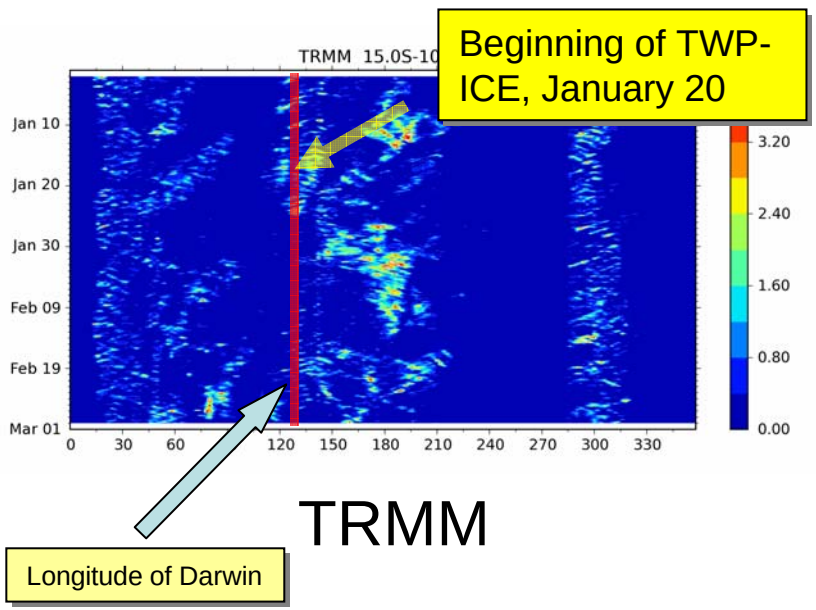




Rainfall spanning the entire globe for the months of January and February, 2007 and centered near the latitude of Darwin (12.425S).

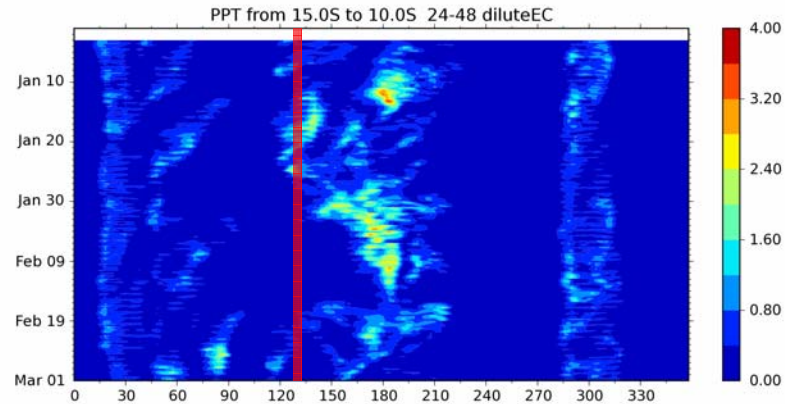
Control



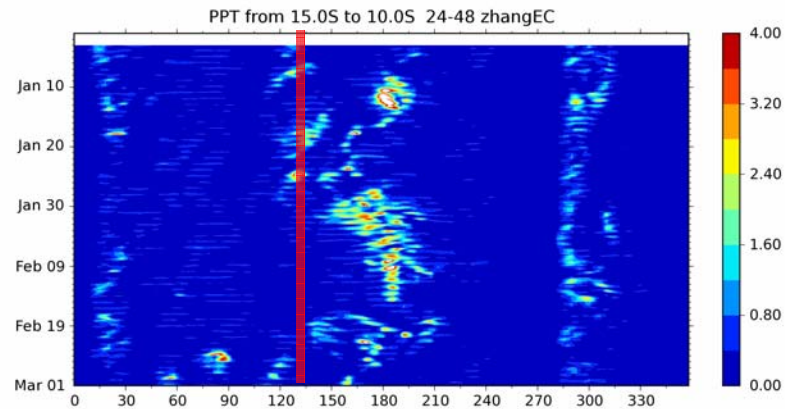


TRMM

Neale

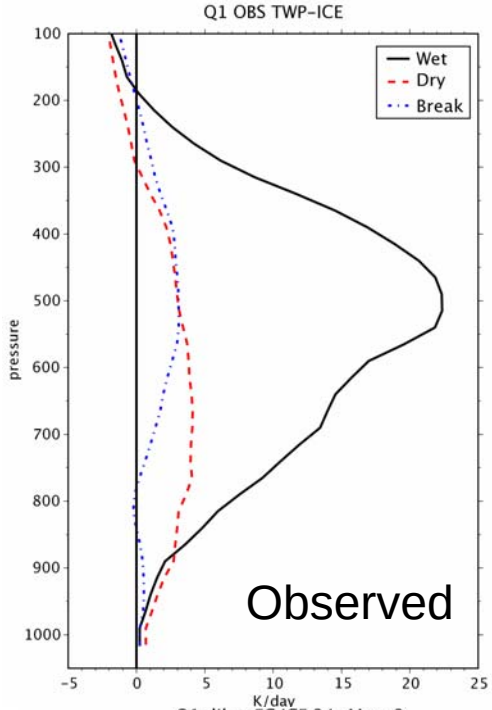


Zhang



Initialized with operational analysis from the ECMWF

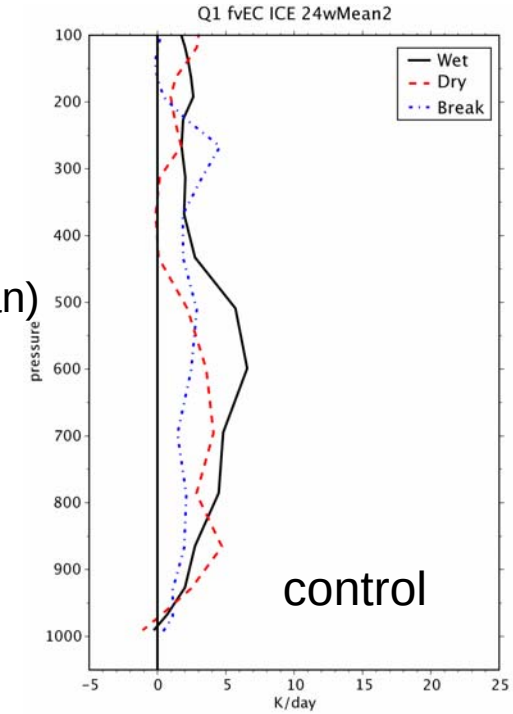
Q1 - diabatic heating

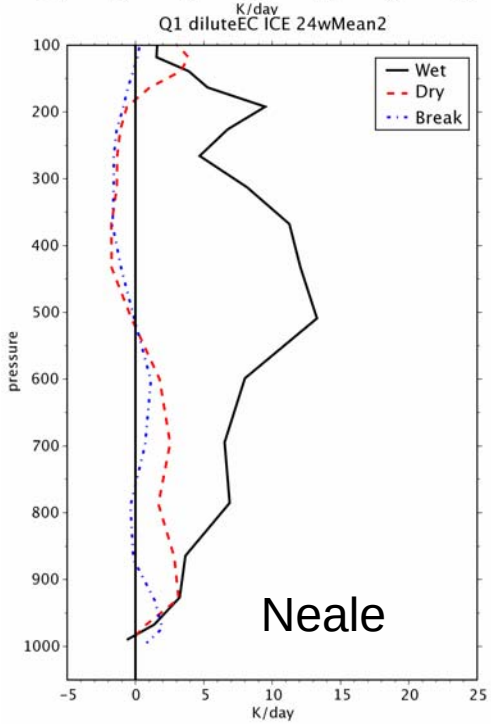


Wet Monsoon-Active (20 Jan-25 Jan)

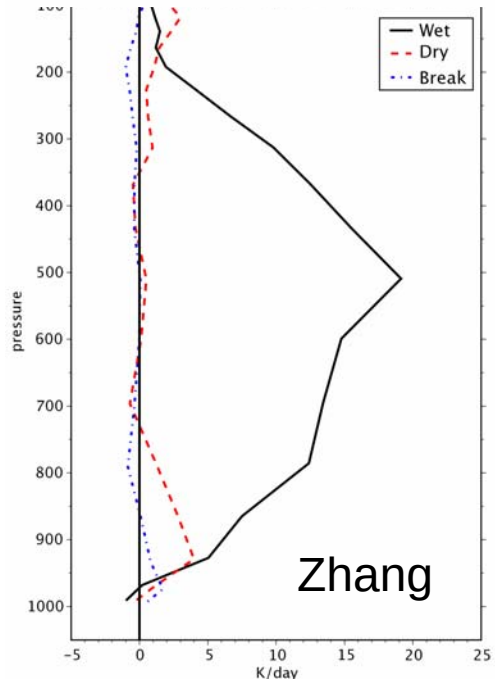
Dry Monsoon (26 Jan-2 Feb)

Break (3 Feb - 13 Feb)





Both the Neale and Zhang have the peak at about the observed level for the active period but the Zhang has a strong overestimate.



Recent CAPT Papers

- Klein et al. “Diagnosis of the summertime warm and dry biases over the U.S. Southern Great Plains in the GFDL climate model using a weather forecasting approach” *Geophysical Research Letters*, 33, L18805,2006.
- Williamson and Olson, “A comparison of forecast errors in CAM2 and CAM3 at the ARM Southern Great Plains Site” *J Climate in press.*
- Boyle et al. “Climate Model Forecast Experiments for TOGA-COARE” *Monthly Weather Review* 2007 (submitted)

Highlights

- CAPT data has proven useful to outside collaborators
- Provided insight into ARM experiments
  - MPACE
  - TWP-ICE
  - SGP