# Results of the TWP-ICE CRM Model Intercomparison

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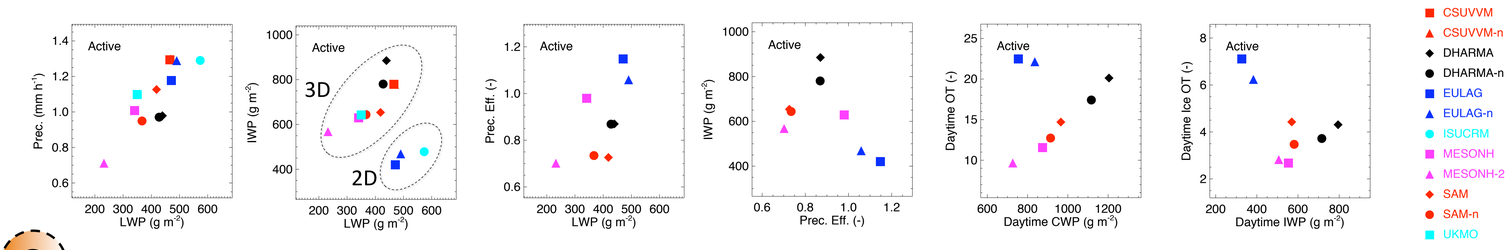
## 8 CRMs simulated 16 days of tropical monsoon.

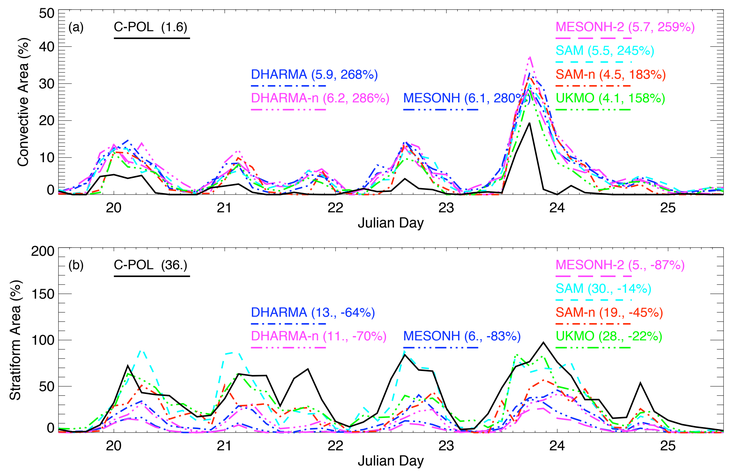
### 1 *CRM diagnostics vary by ≈ 2X across the board*

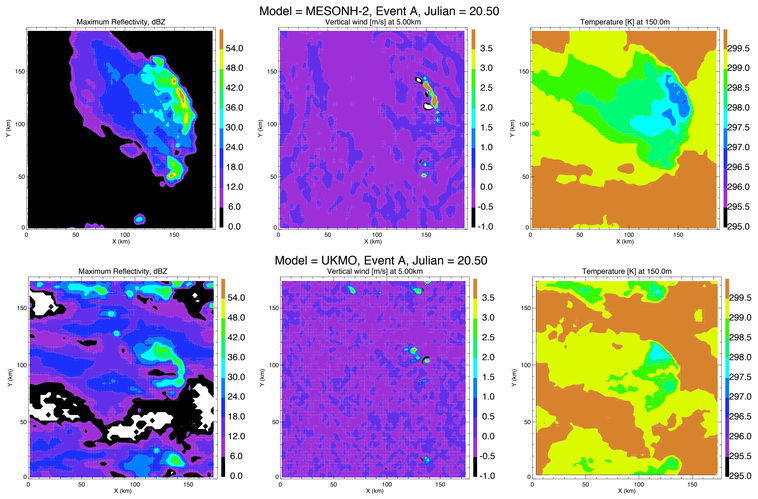
The main forcing for convection is large-scale vertical ascent. Results vary with dynamics and microphysics (active period shown here).




### 2 *Stratiform cloud structure is even more variable*

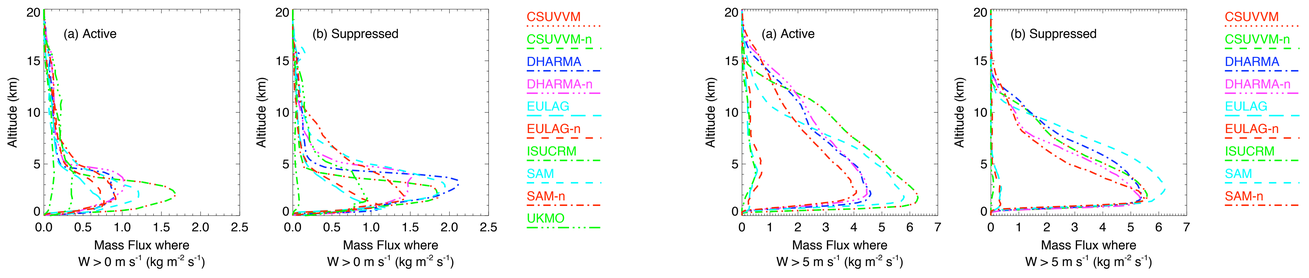
Convective and stratiform areas are objectively identified in 3D models that reported reflectivity and in radar fields at z = 2.5 km using a modified Steiner et al. (1995) texture algorithm (model reflectivities degraded to 2.5-km resolution to match C-POL). Results indicate 6X differences in stratiform area (left) related to detrainment, updrafts, downdrafts, and cold pools (examples at right).



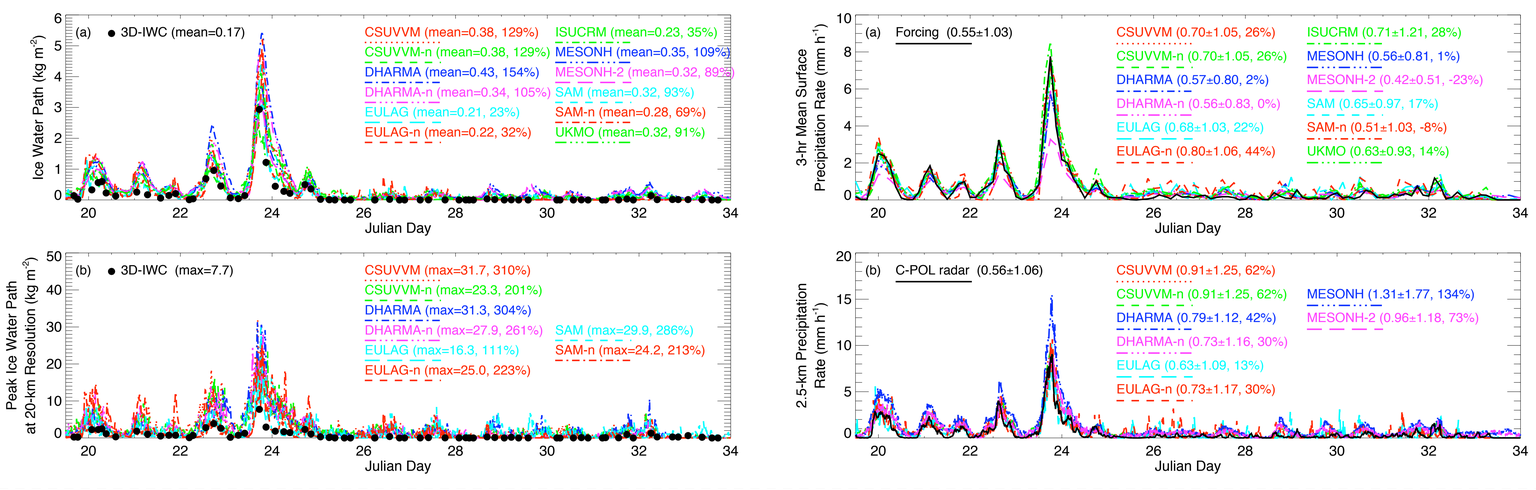

### 3 *Mass fluxes are ≈ 2X lower in 2D vs 3D models*

Upward mass fluxes averaged over cloudy grid cells where w > 0 m/s are systematically lower in 2D models (EULAG and ISUCRM, left) and differences are larger in averages over cloudy grid cells where w > 5 m/s (right). Implications for MMF development?




### 4 *Are any of the models "right"?*

Mean IWP is 20-150% greater than 3D-IWC retrievals (left), but using C-POL 2.5-km precipitation as surface value in forcing derivation should account for part of the difference (right). Overestimates of IWP consistent with excessive convective area (above). Uncertainties in forcings and measurements are on the order of model spread. Precipitation structure the strongest test of model skill?




## Analyze yourself!

### 1 *Download the ensemble*

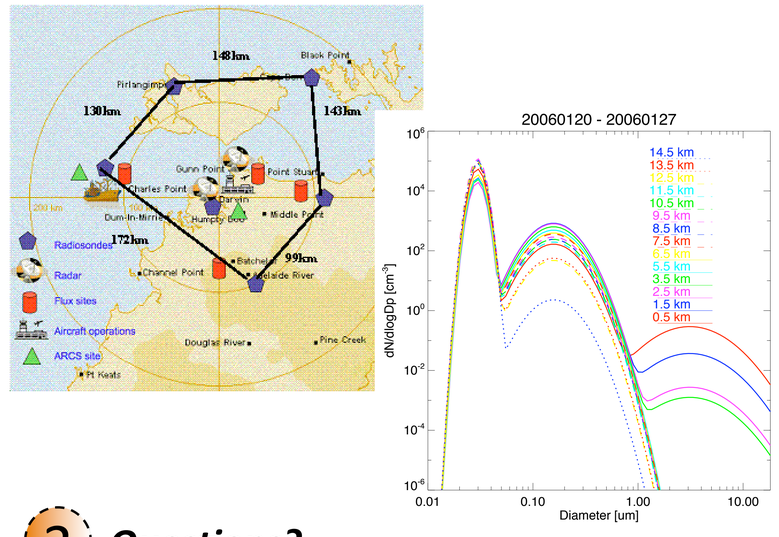
Adam Varble and Ed Zipser have already done it (see Varble et al. at this meeting). So has Courtney Schumacher. No CRM? No problem. Results archived for public use in self-documenting CF-compliant netCDF format with standardized metadata. Three file types available for each model: 3D fields (3-h frequency, one variable per file), and profiles and scalars (10-min frequency, one file each).

***Current combinations of dynamics (2D/3D) and microphysics (1M/2M) with availability of reflectivity + sensitivity test***

| Model | Dim | ΔX | Micro | dBZ | Sens |
|---|---|---|---|---|---|
| CSUVVM | 3D | 1 km | single | | ✔ |
| DHARMA | 3D | 0.9 km | single | ✔ | ✔ |
| EULAG | 2D | 1 km | double | ✔ | ✔ |
| ISUCRM | 2D | 3 km | single | | |
| MESONH | 3D | 1 km | single | ✔ | |
| MESONH-2 | 3D | 1 km | double | ✔ | |
| SAM | 3D | 1 km | double | ✔ | ✔ |
| UKMO | 3D | 0.9 km | single | ✔ | |

### 2 *Run the case*

Got CRM? Compare with the others and the processed data streams, also archived in CF-compliant netCDF with metadata that matches the profiles and scalars reported. A unique feature is the availability of an idealized aerosol profile based on measurements from multiple aircraft (below).




### 3 *Questions?*

See the TWP-ICE modeling web site for more information:

***http://science.arm.gov/wg/cpm/scm/scmic6***