



Comparison of CRM simulations with observations for MC3E convective clouds

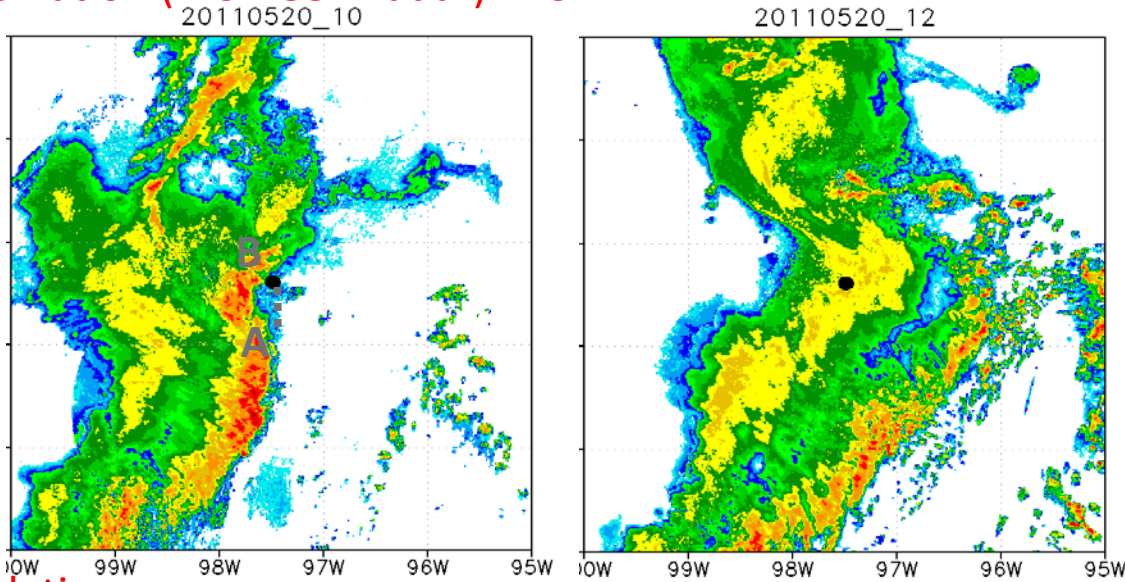
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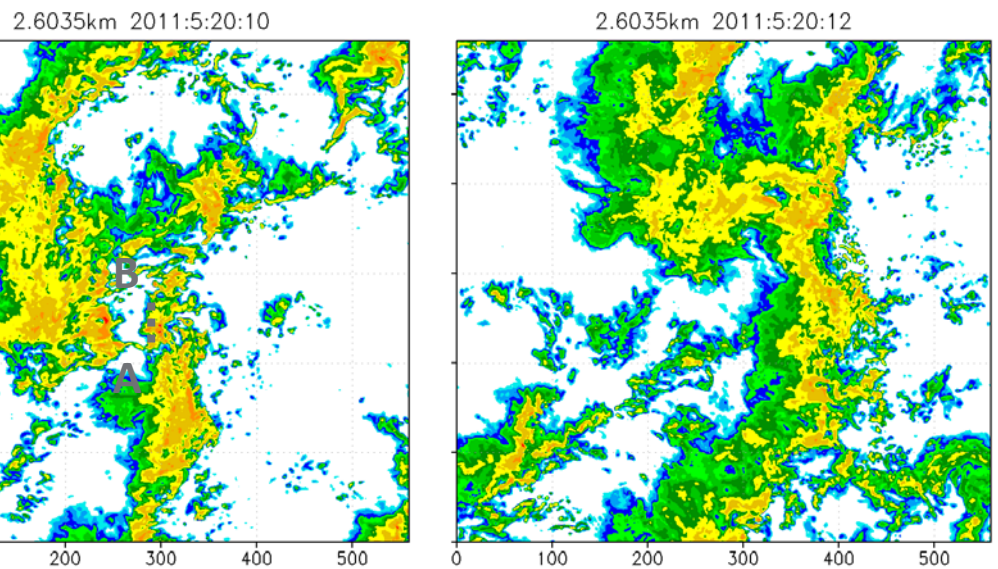
Richland, WA

- ▶ May 20 and 23
- ▶ WRF3.3.1-LES for **May 20** using LSF from Shaocheng
WRF-real for **May 23** using NARR
- ▶ Resolution of 1 km. Domain 560 km*560 km
- ▶ Surface random perturbation for **May 20**
- ▶ Spectral-bin microphysics (Khain et al. 2004; Fan et al. 2012)
- ▶ CCN counter at surface: **1412 cm⁻³ at supersaturation of 0.4%**

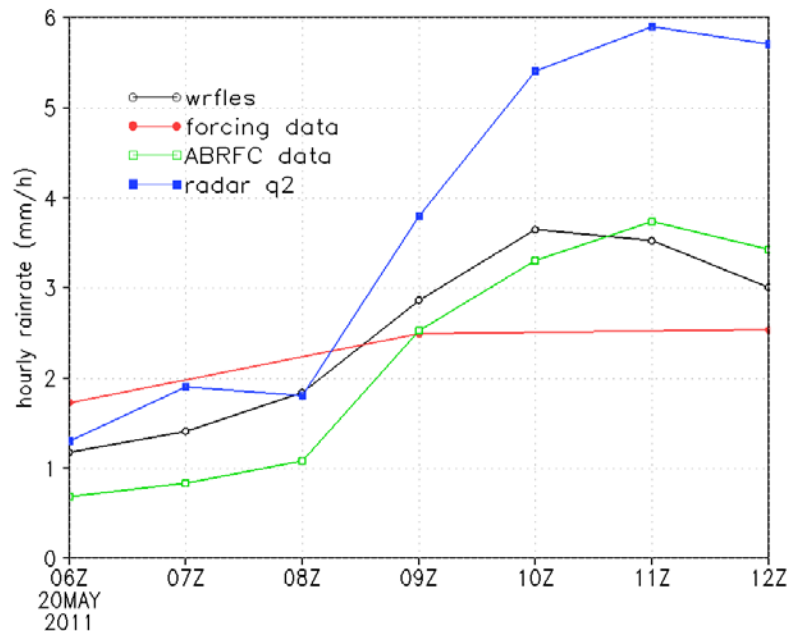
Observation (WSR-88D radar): 2.5 km



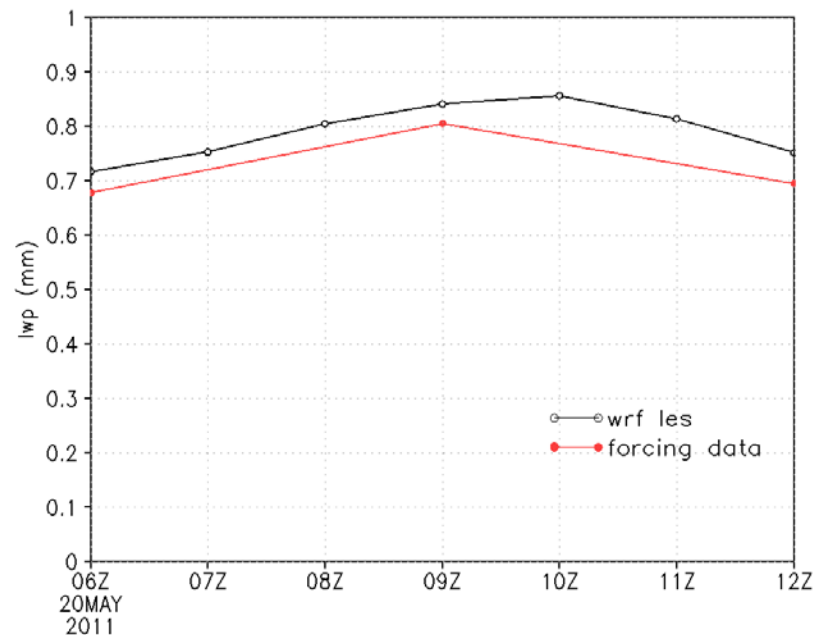
Simulation



Domain averaged precipitation

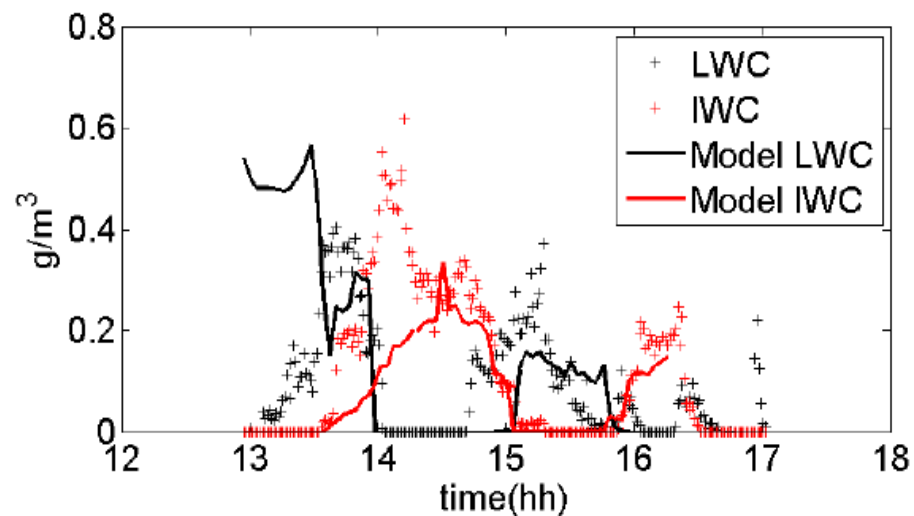
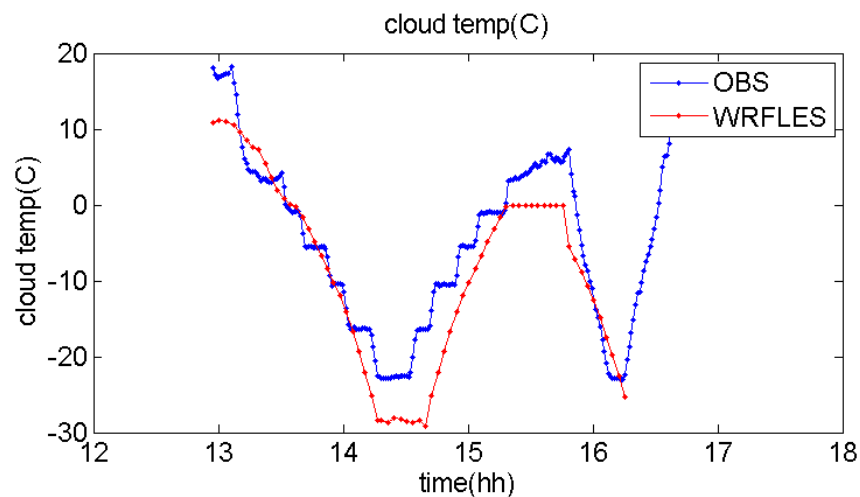
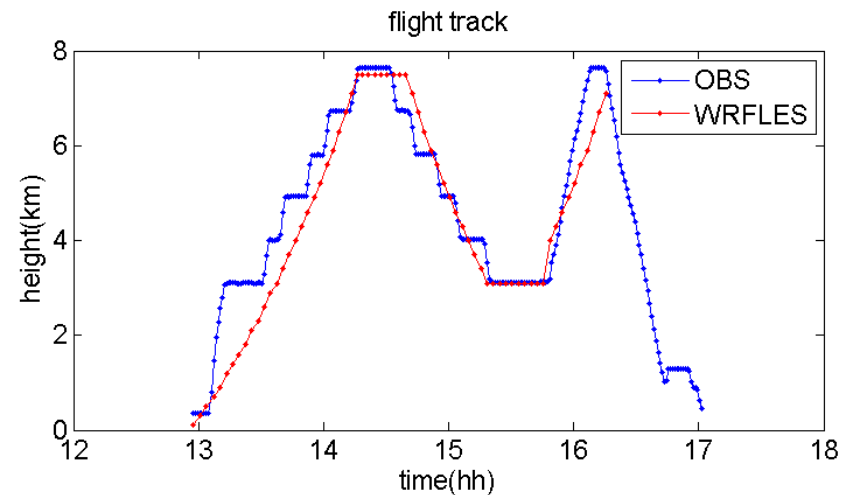
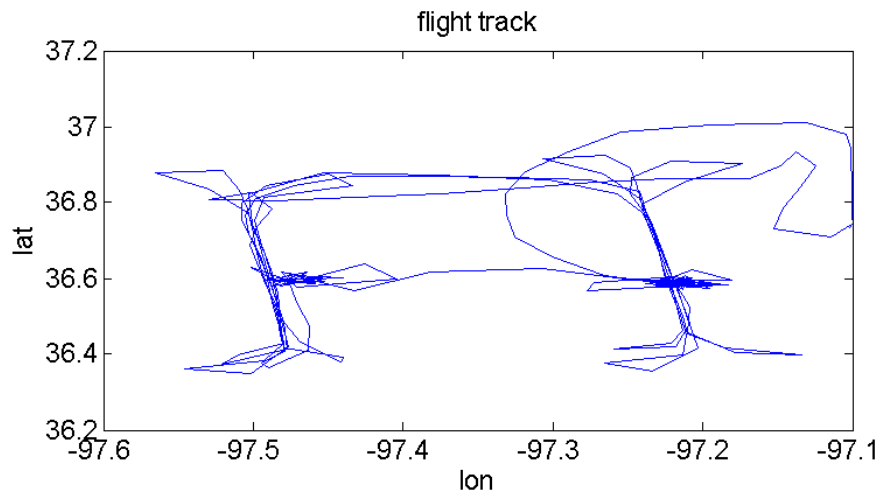


Domain averaged LWP

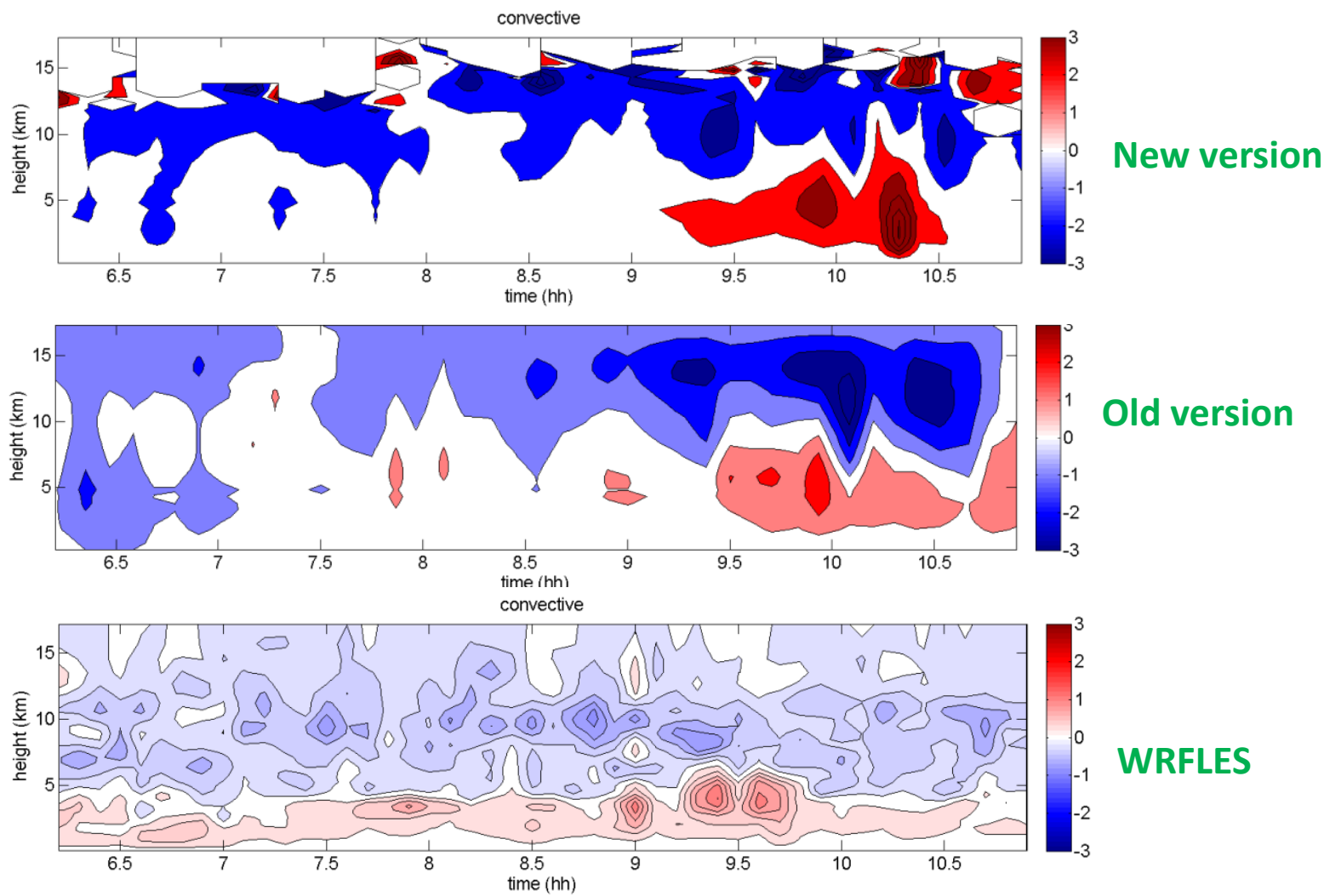


OBS average area: 300 km x 300 km centered at SGP site (-95.49°W, 36.61N)

Comparison with aircraft data

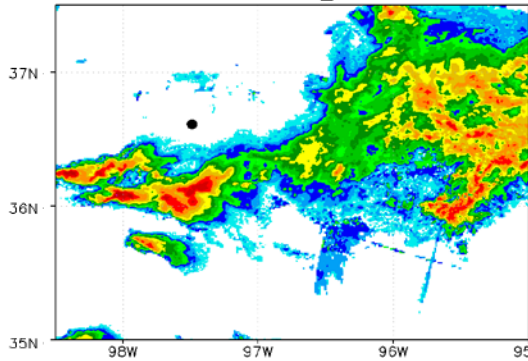


Profile of time-series mean W

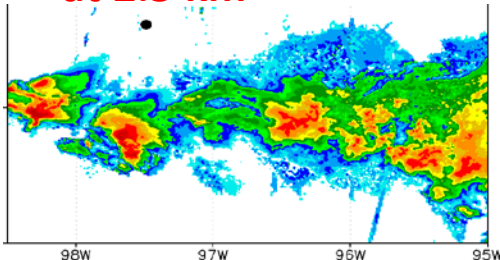


May 23 : WRF-real

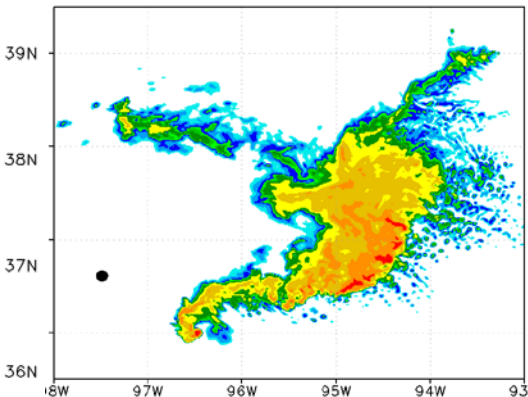
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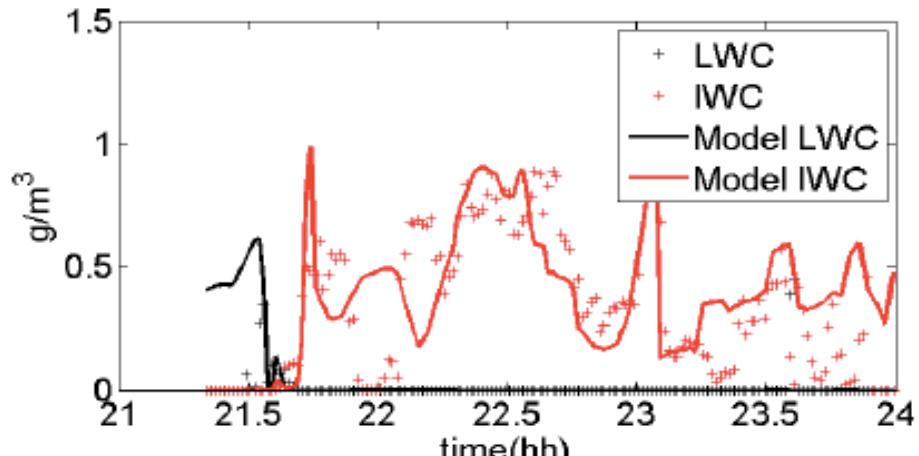
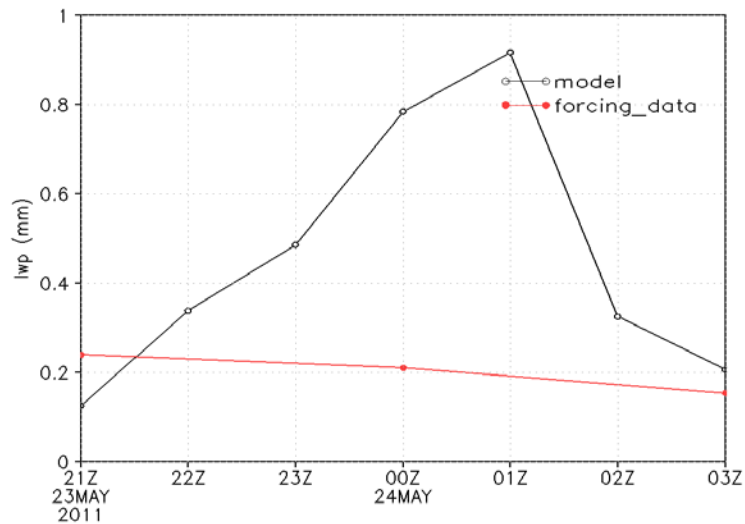
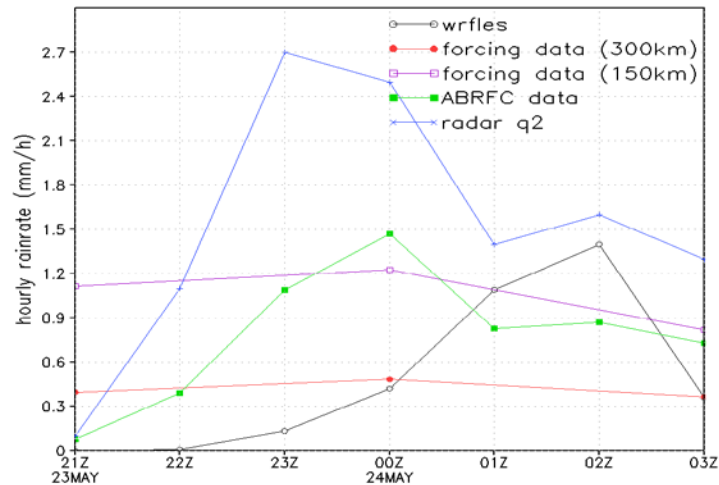
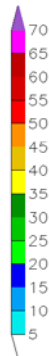
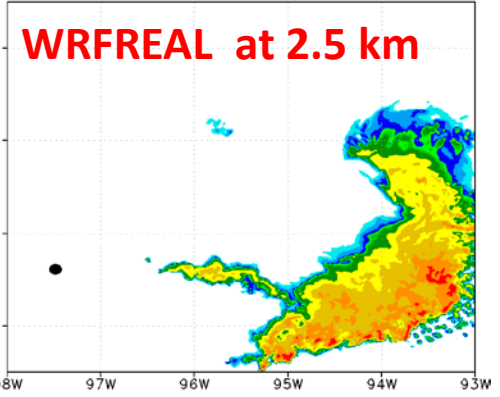
**Observation
at 2.5 km**



2011:5:24:2



WRFREAL at 2.5 km



Data Needed

- ▶ **Cloud microphysical properties: LWC/IWC, Nc/Ni**
- ▶ **More consistent precipitation data (range is too large among different datasets)**
- ▶ **Vertical velocity data especially at convective core area**
- ▶ **areal coverage for convective and stratiform/anvil area**
- ▶ **Aerosol/CCN size distribution (important input for more explicit microphysics scheme)**