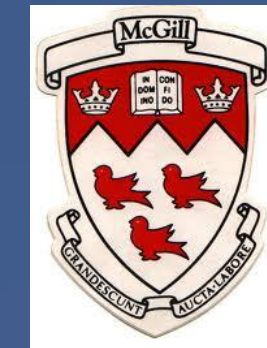


# Large-scale Atmospheric State and Cloud/Precipitation Characteristics During MC3E



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## MC3E April 22 – June 6

### ARM Southern Great Plains Central Facility

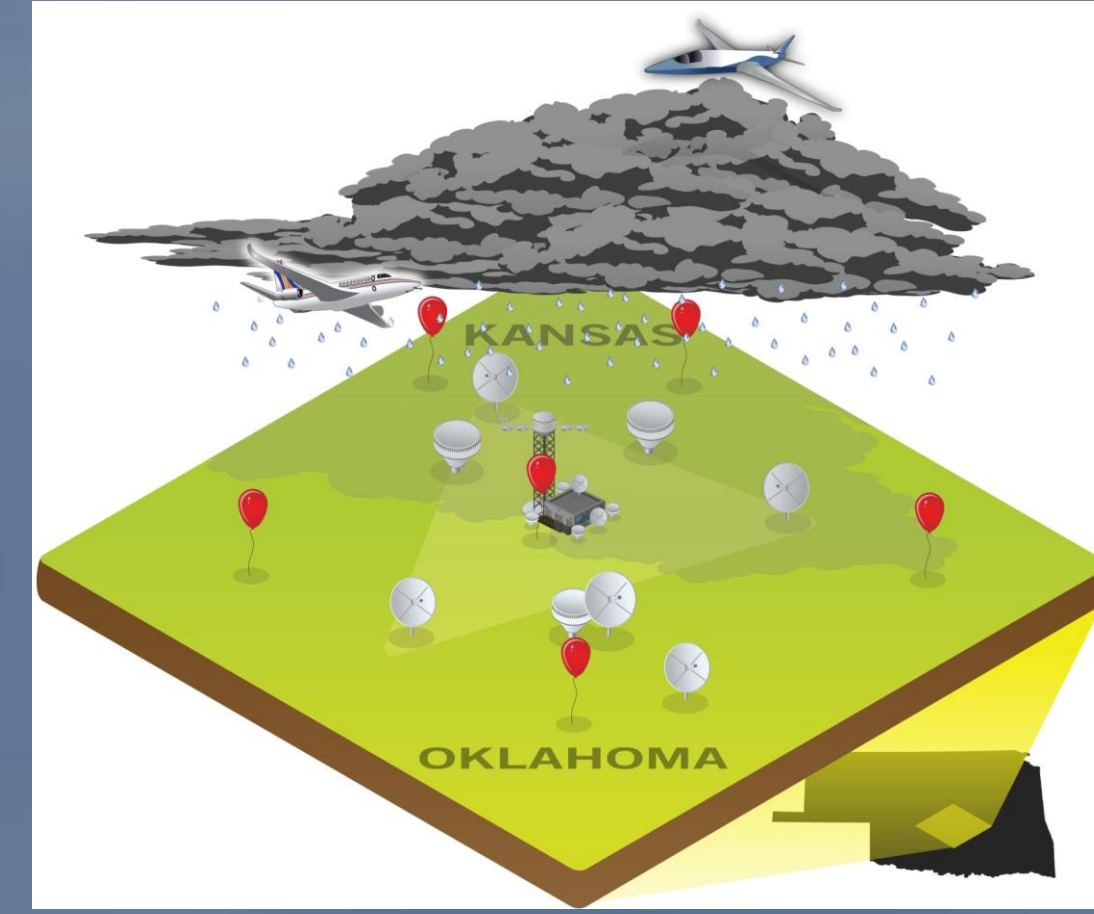
Represents a collaborative effort between the DOE ASR Program and the NASA Global Precipitation Measurement (GPM) mission

#### Overarching Science:

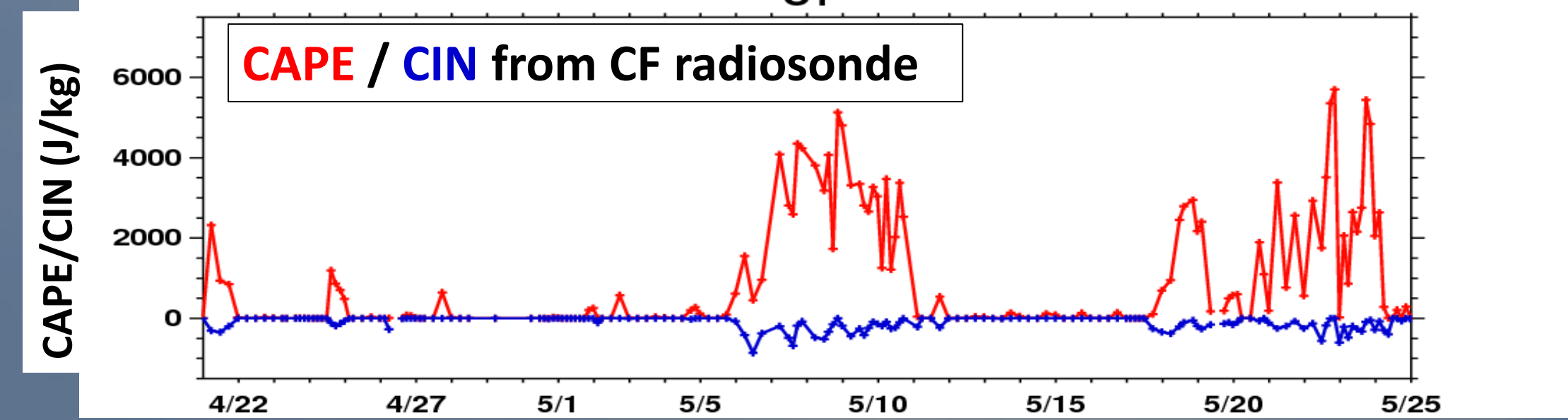
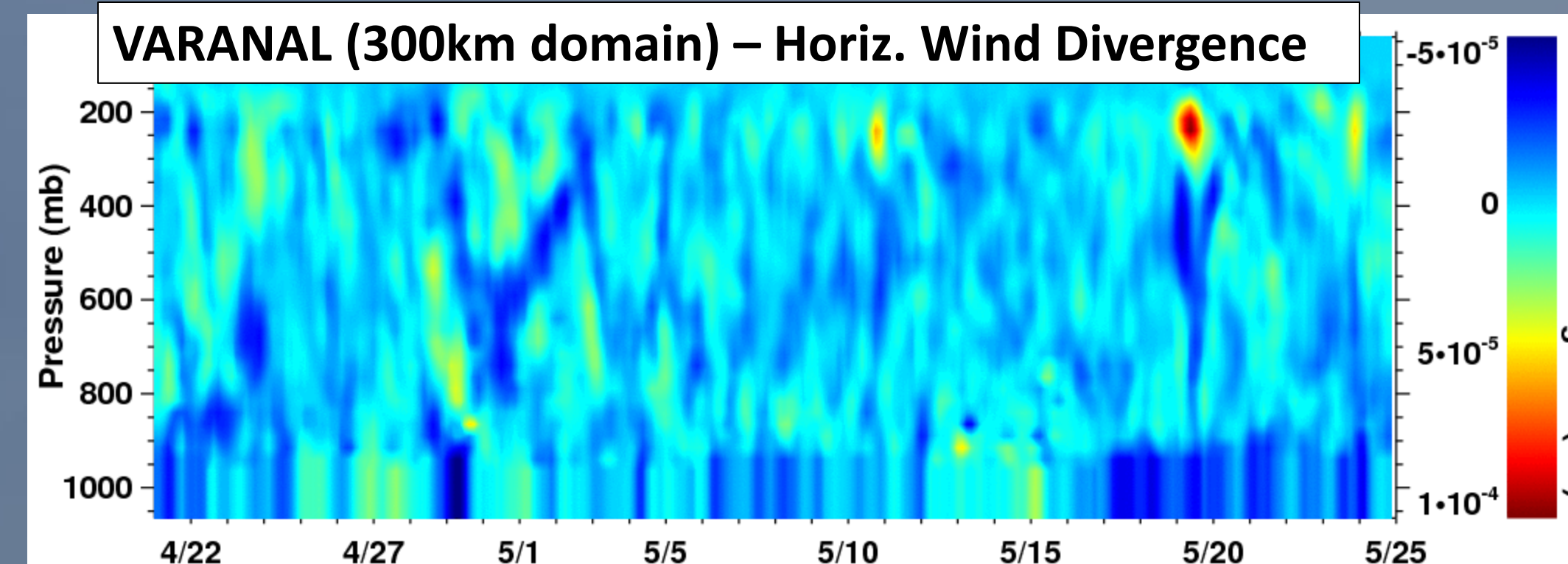
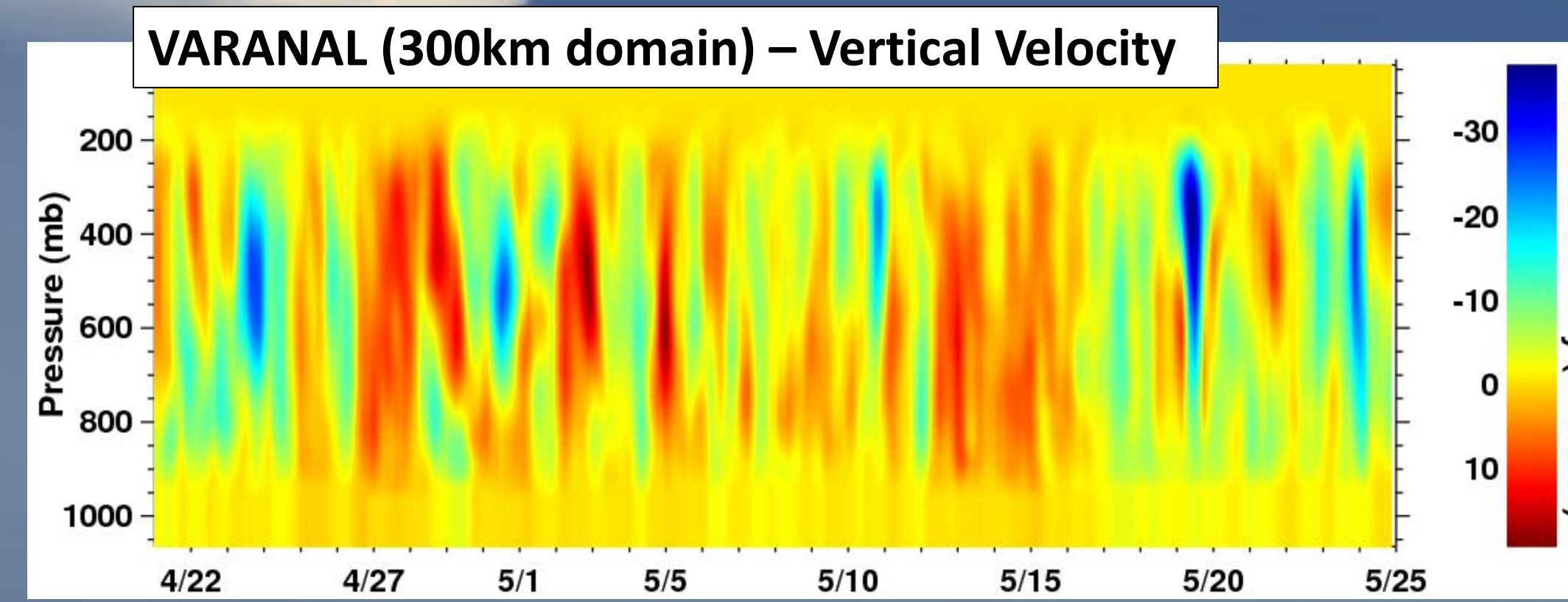
A complete characterization of convective cloud systems in order to:

1) Advance the understanding of the different components of convective parameterization

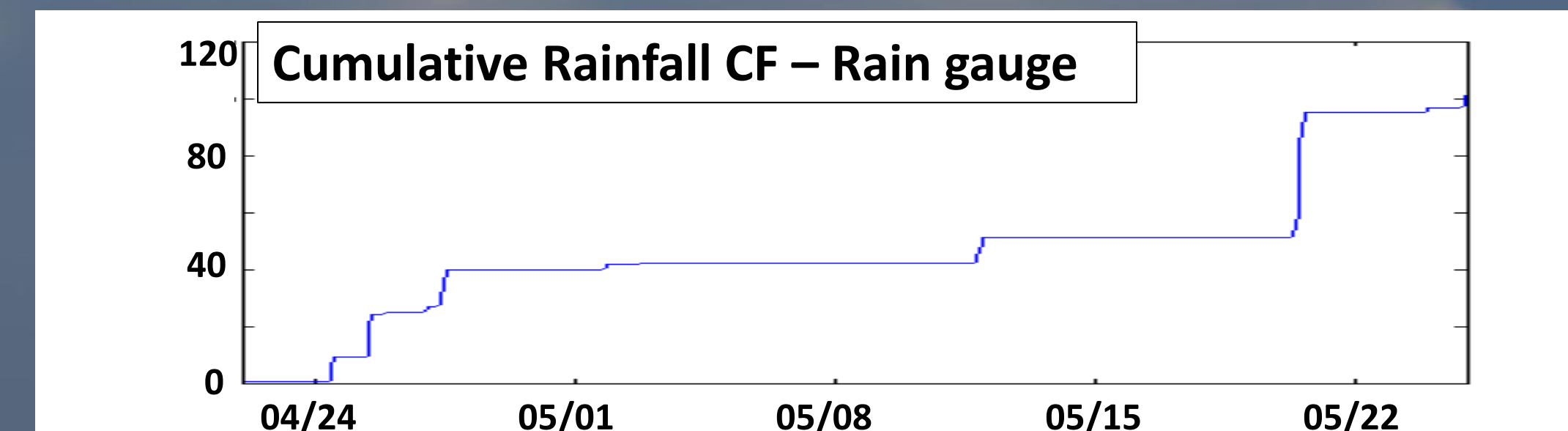
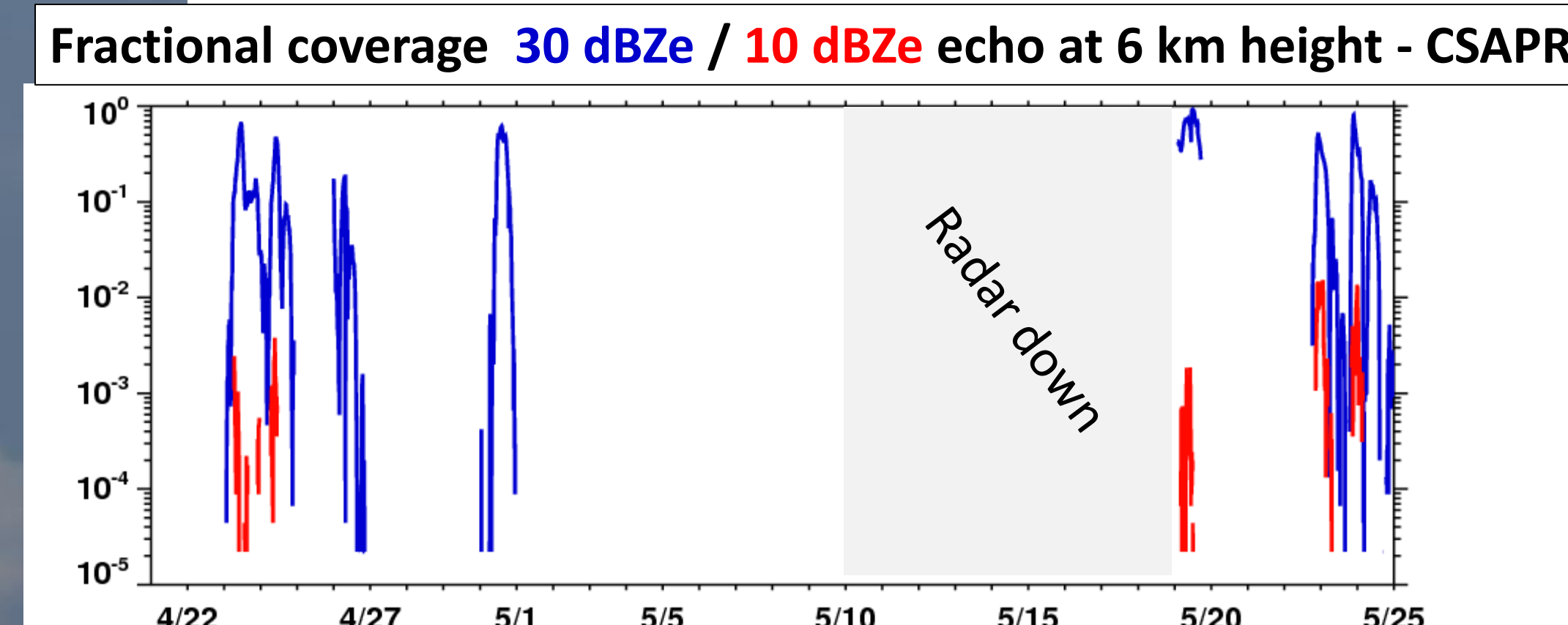
2) Improve the fidelity of satellite estimates of precipitation over land.



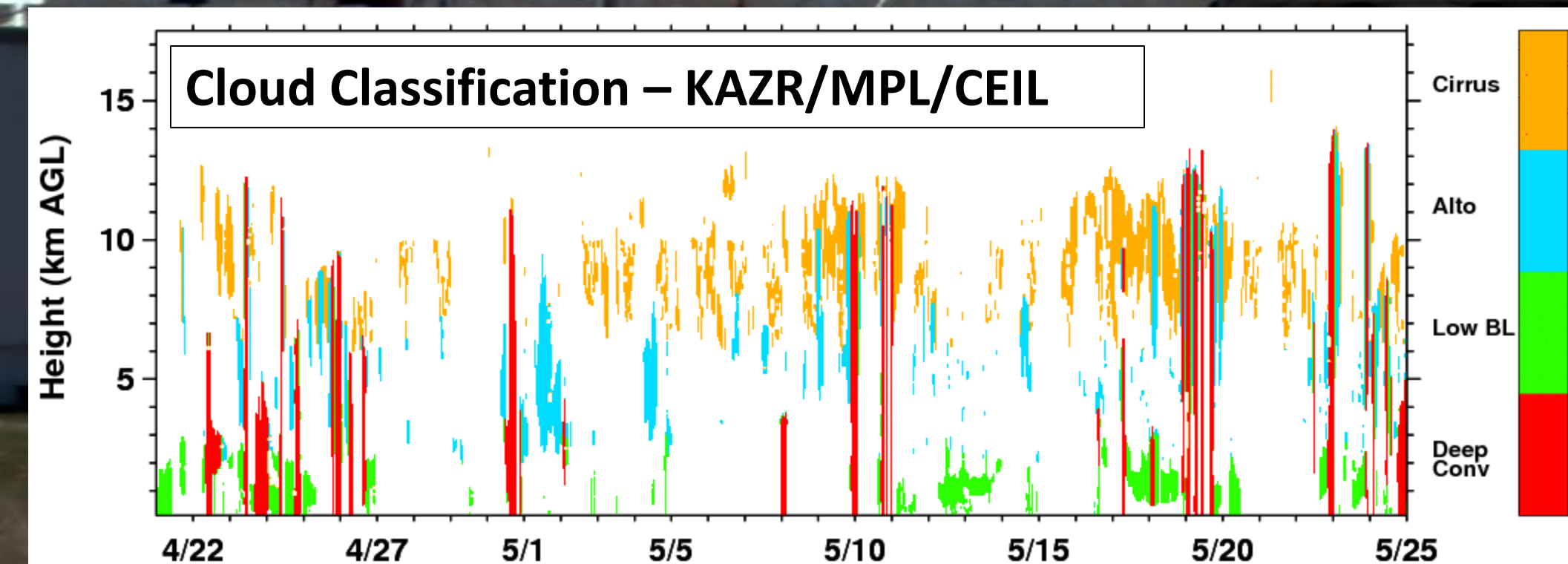
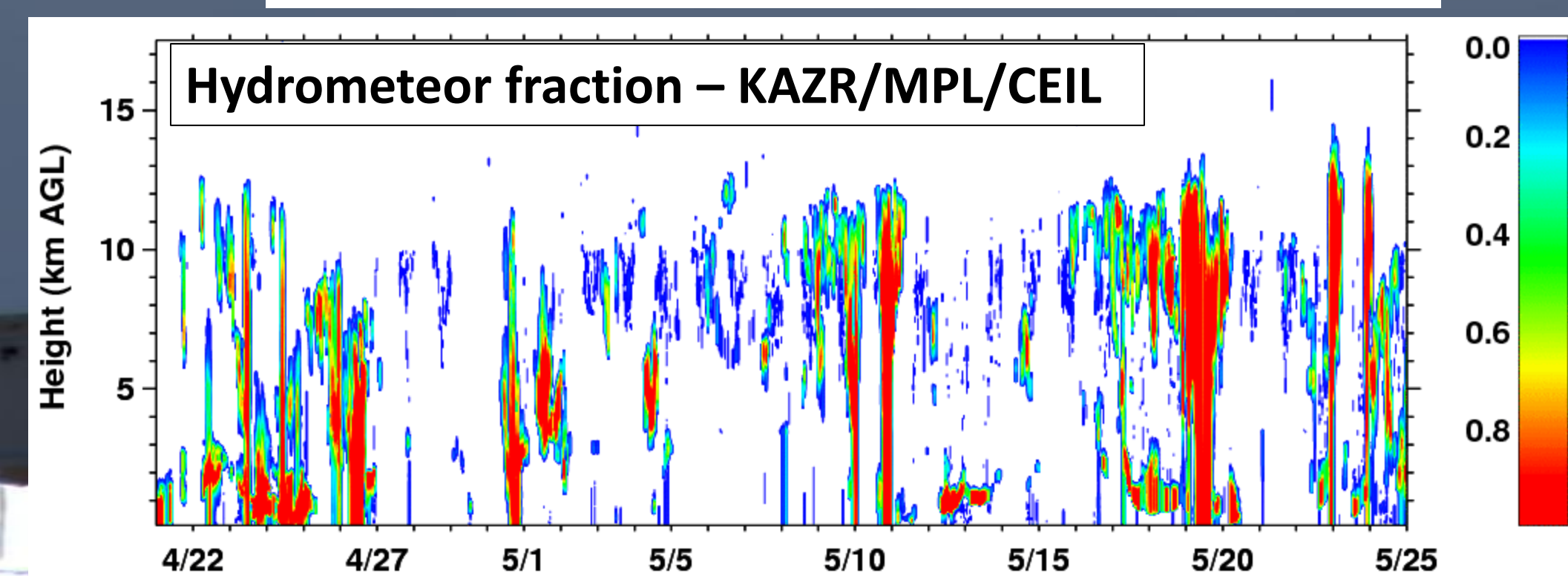
## Large-scale Atmospheric State



## Precipitation Characteristics



## Cloud Characteristics



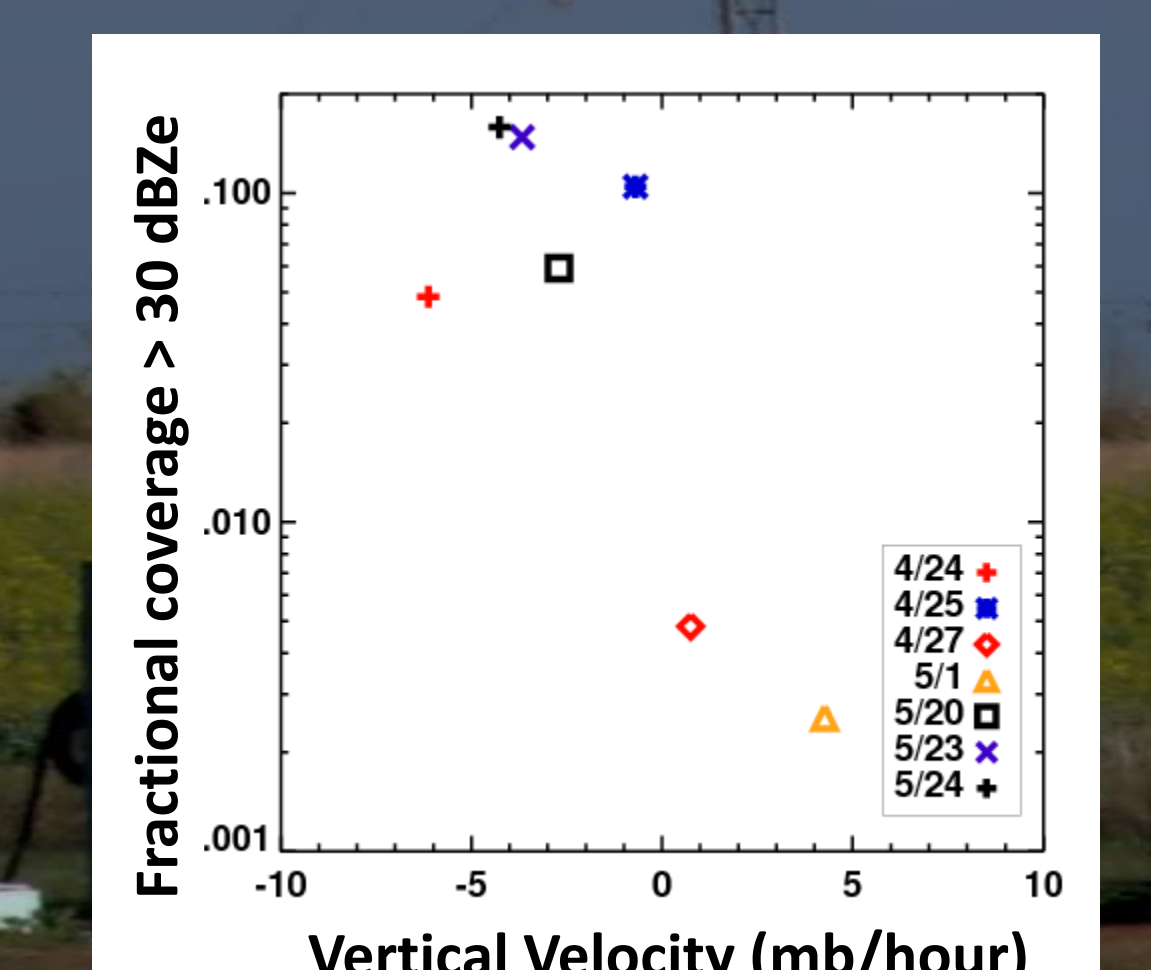
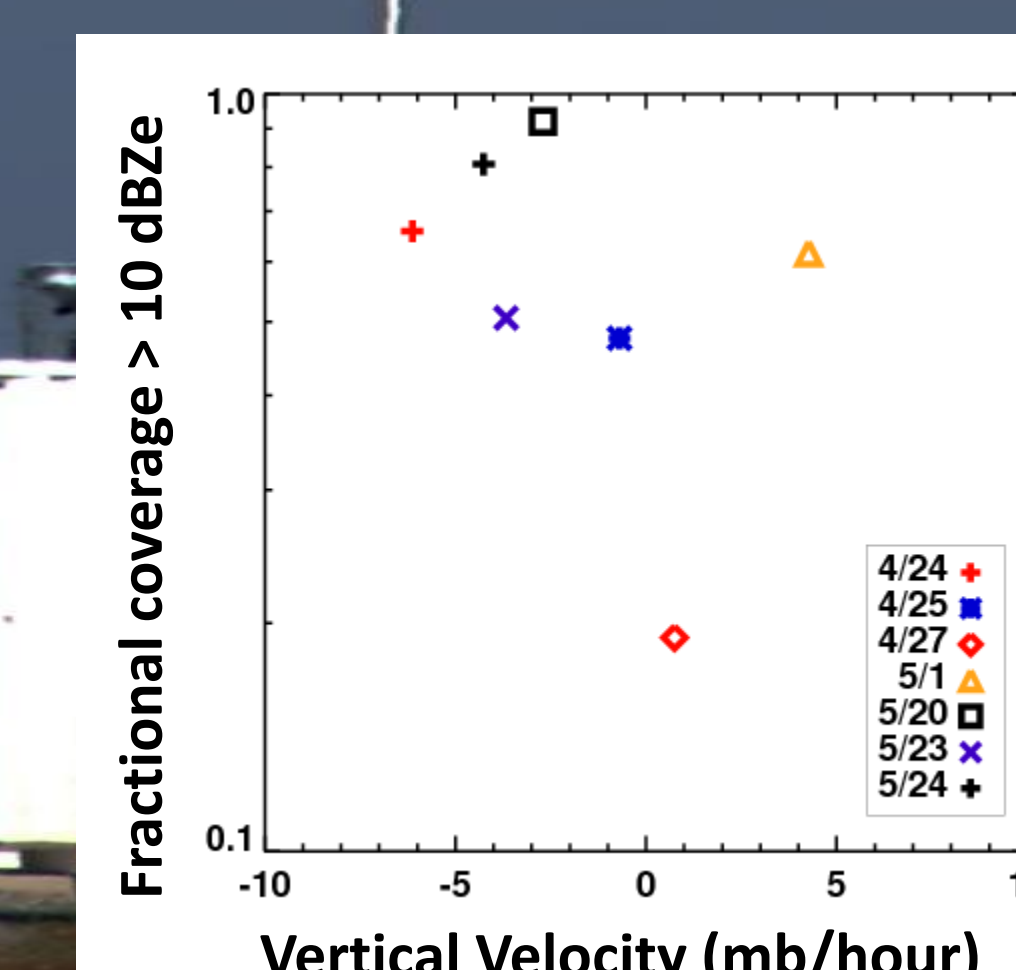
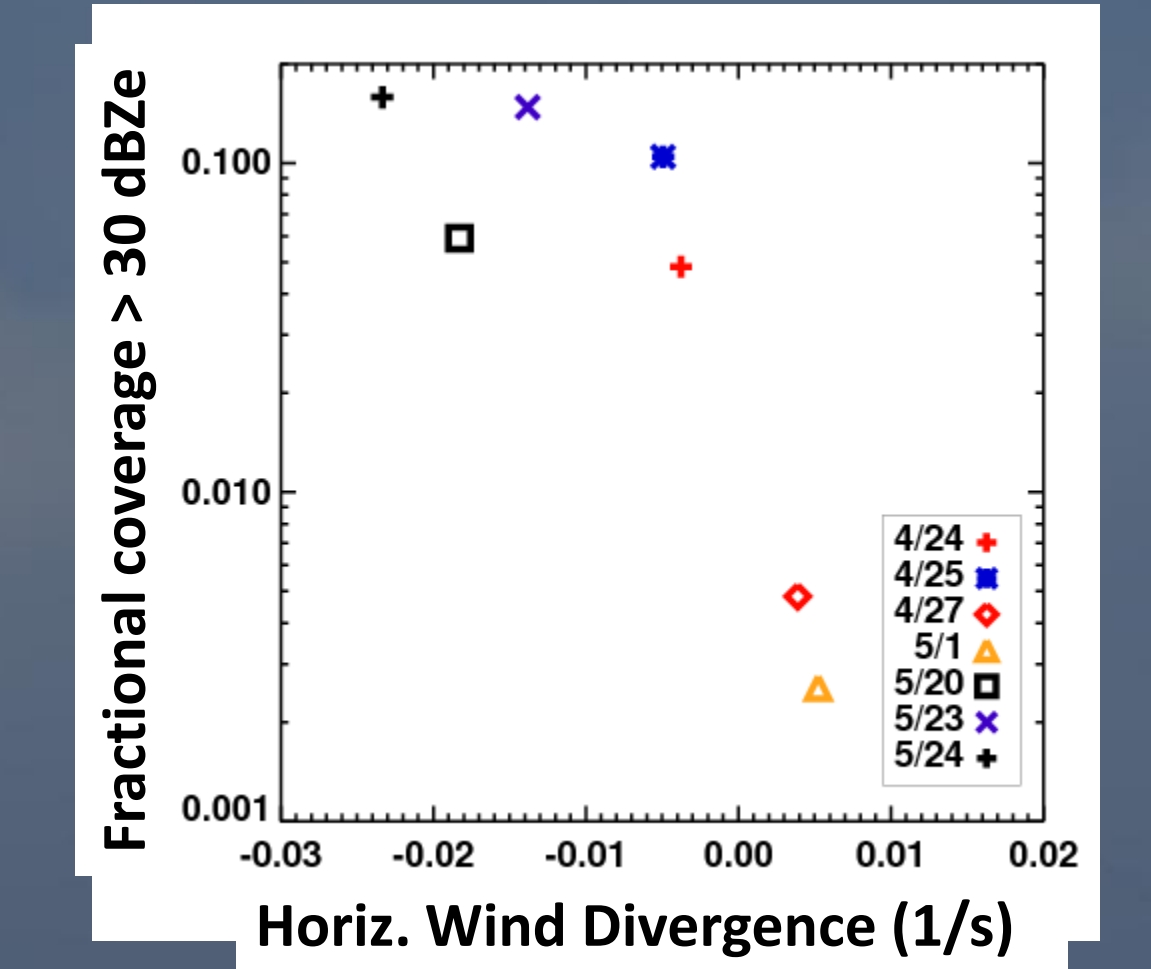
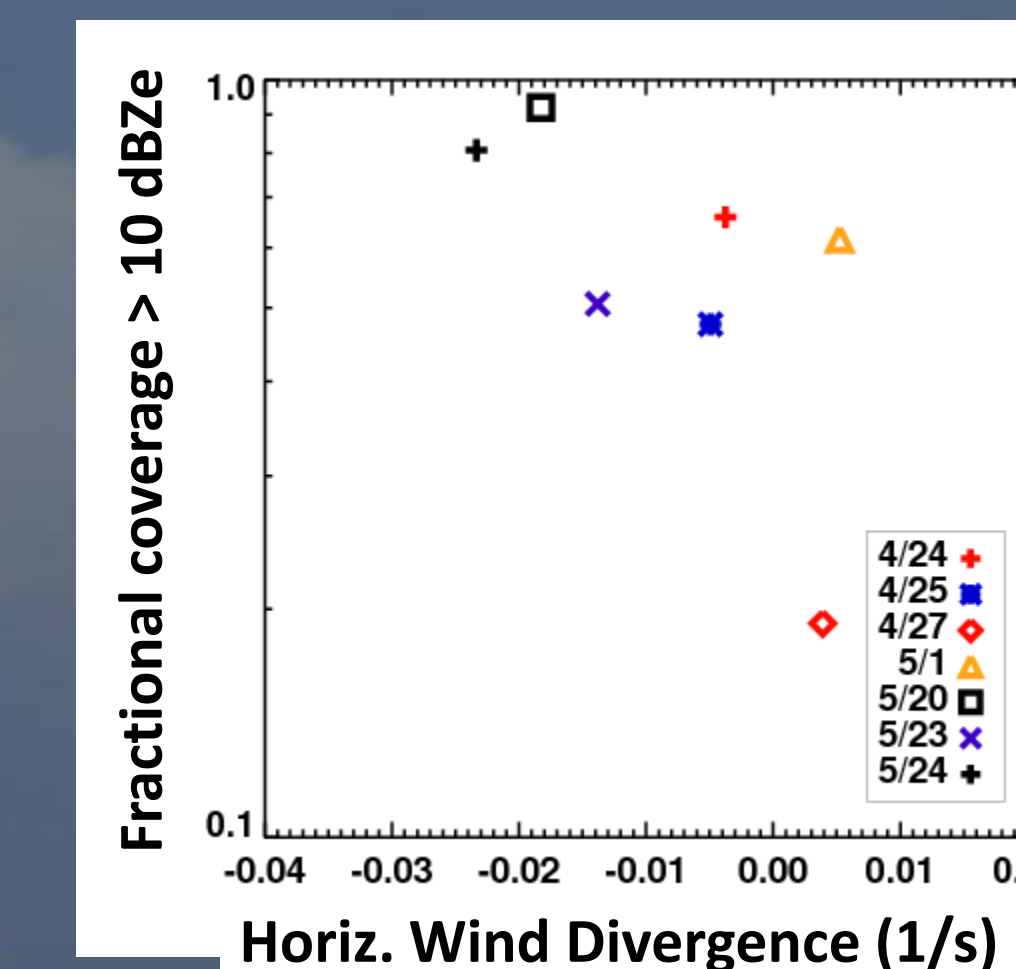
## Summary of conditions sampled during MC3E

Cat	Description	# days sampled	Days
1	Convective Line / Cell events	8	4/22,25; 5/11,18,20,23,24,31
2	Widespread Stratiform Rain	3	4/27, 5/1, 5/10
3	Elevated Weak (Overnight) Convection	3	4/23, 24; 5/18
4	Boundary Layer Clouds	10	4/26; 5/5,13-15,19,27-29;6/1
5	Mid- or Upper-level clouds	7	5/2,3,8,9,25,26; 6/2
6	Clear	14	

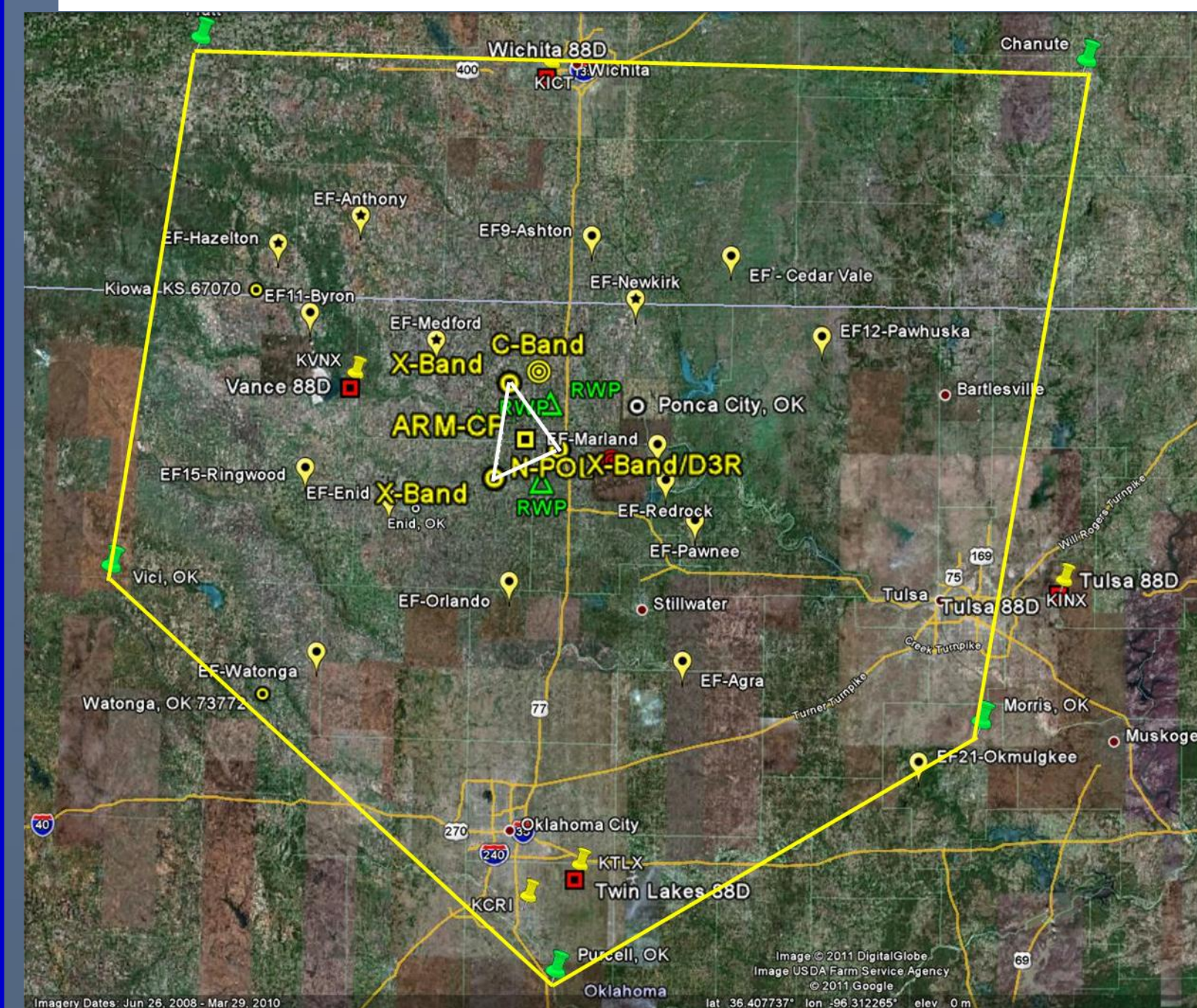
- Coordinated aircraft missions focused on categories 1 & 2
- Dedicated boundary layer cloud flights by UND Citation 5/27 & 5/30
- Enhanced sounding operations focused on categories 1-3

## Correlations between large-scale atmospheric state and cloud/precipitation properties

- 7 distinct "events" observed by C-SAPR during MC3E
- VARANAL(300 km domain) variables (horizontal wind divergence and vertical velocity) are 6 hour averages prior to detection of 10 dBZe echo
- Fraction of areal coverage at 6 km (10dBZe/30dBZe) represents maximum per event (proxy for convective "strength")



## MC3E Surface -Based Instrument Network



### Radiosonde Array

- Six launch sites  
Pratt, KS [S1]; Chanutte, KS [S2]; Vici, OK [S3]; Morris, OK [S4]; Purcell, OK [S5]; Lamont, OK [C1]
- Launch Frequency 4-8x per day
- More than 1400 launches during 6 week campaign

### Multi-frequency, Multi-scale radar

- X-band radar network (X-SAPR)
- NASA S-band Transportable Dual-Polarimetric Radar (NPOL)
- C-Band Scanning ARM Precipitation radar (C-SAPR)
- Ka-band ARM Zenith Pointing Radar (KAZR)
- ARM Ka/W scanning cloud radar (Ka-SACR/W-SACR)
- ARM 915 MHz RWP



### MC3E Disdrometer Facility

- 16 Parsivel disdrometers
- 5 3<sup>rd</sup> generation 2D video Disdrometers
- 20 Rain gauges

