Summary of ARM observations of convective cloud lifecycle during the Midlatitude Continental Convective Clouds Experiment (MC3E)

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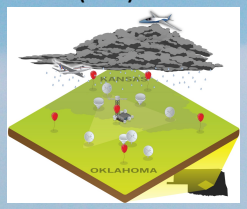
MC3E April 22 – June 6

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:

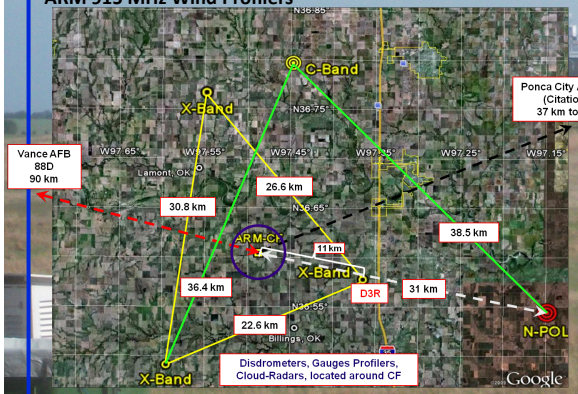
A complete characterization of convective cloud systems in order to:

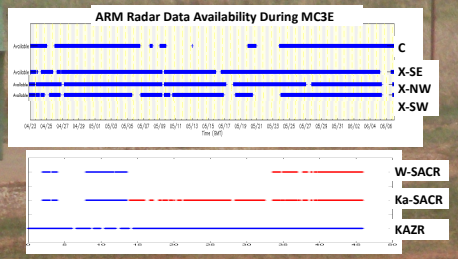
1) Advance the understanding of the different components of convective parameterization

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

Multi-frequency, Multi-scale Radar

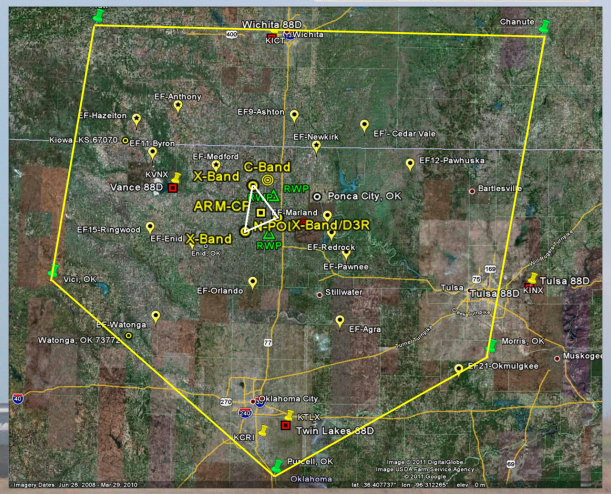
- **X-band radar network (X-SAPR)**
- **C-band (Dual Polarization) Scanning ARM Precipitation Radar (C-SAPR)**
- **ARM Dual-Wavelength (Ka/W) Scanning Cloud Radar (Ka-SACR/W-SACR)**
- **ARM 915 MHz Wind Profilers**





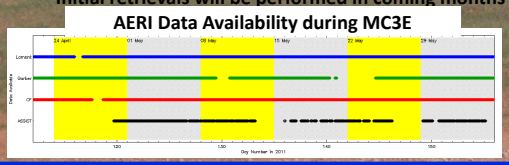
Radiosonde Array

- **Six launch sites**
  - **Pratt, KS**
  - **Chanutte, KS**
  - **Vici, OK**
  - **Morris, OK**
  - **Purcell, OK**
  - **Lamont, OK**
- **Launch Frequency 4-8x per day**



Inner Domain Thermodynamic Profiling during MC3E

- **Objective: to characterize "small-scale" horizontal gradients in temperature and water vapor in pre-convective and convective environments**
- **Approach: deploy ground-based infrared spectrometers (i.e., AERIs) at each of the ARM X-band radar locations; retrieve T/q profiles from radiance observations**
- **Status as of Sep 2011:**
  - **Data collection was reasonably complete**
  - **Analysis of calibration underway**
  - **Initial retrievals will be performed in coming months**

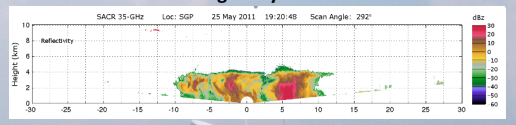


Observational Highlights

Category	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	

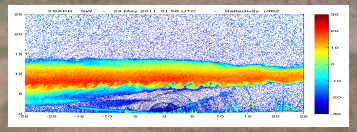
25 May 2011 – Shallow Cumulus Lifecycle

- **Along wind scanning by radar allows observation of lifecycle of clouds**
- **First dataset of the complete lifecycle of shallow convective clouds observed by scanning ARM cloud radar**
- **Additional scanning observations of fair-weather cloud systems with coordinated in situ flights by the UND Citation**



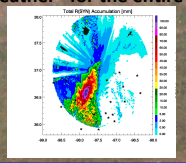
24 May 2011 - Mammatus clouds

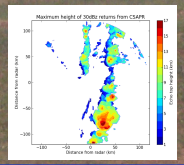
- **X-band radar systems have provided better than expected observations of clouds**
- **Several excellent cases for multi-Doppler analysis of atmospheric motions**
- **Excellent case of anvil base mammatus clouds were observed over the SGP CF during an (RHI) cross section scan.**



24 May 2011 - Strong convective line

- **C-SAPR provides large-scale surveillance of precipitation and dedicated (RHI) cross-sections over the SGP Central Facility**
- **On 05/24 SGP CF was in a regions of "High Risk of Severe Weather" for the entire day**





ARM MC3E data available at:

http://www.archive.arm.gov

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