Cloud Lifecycle WG VAP development activities

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Xiao Chen/Qi Tang
UQ-MICROBASE

Yan Shi*
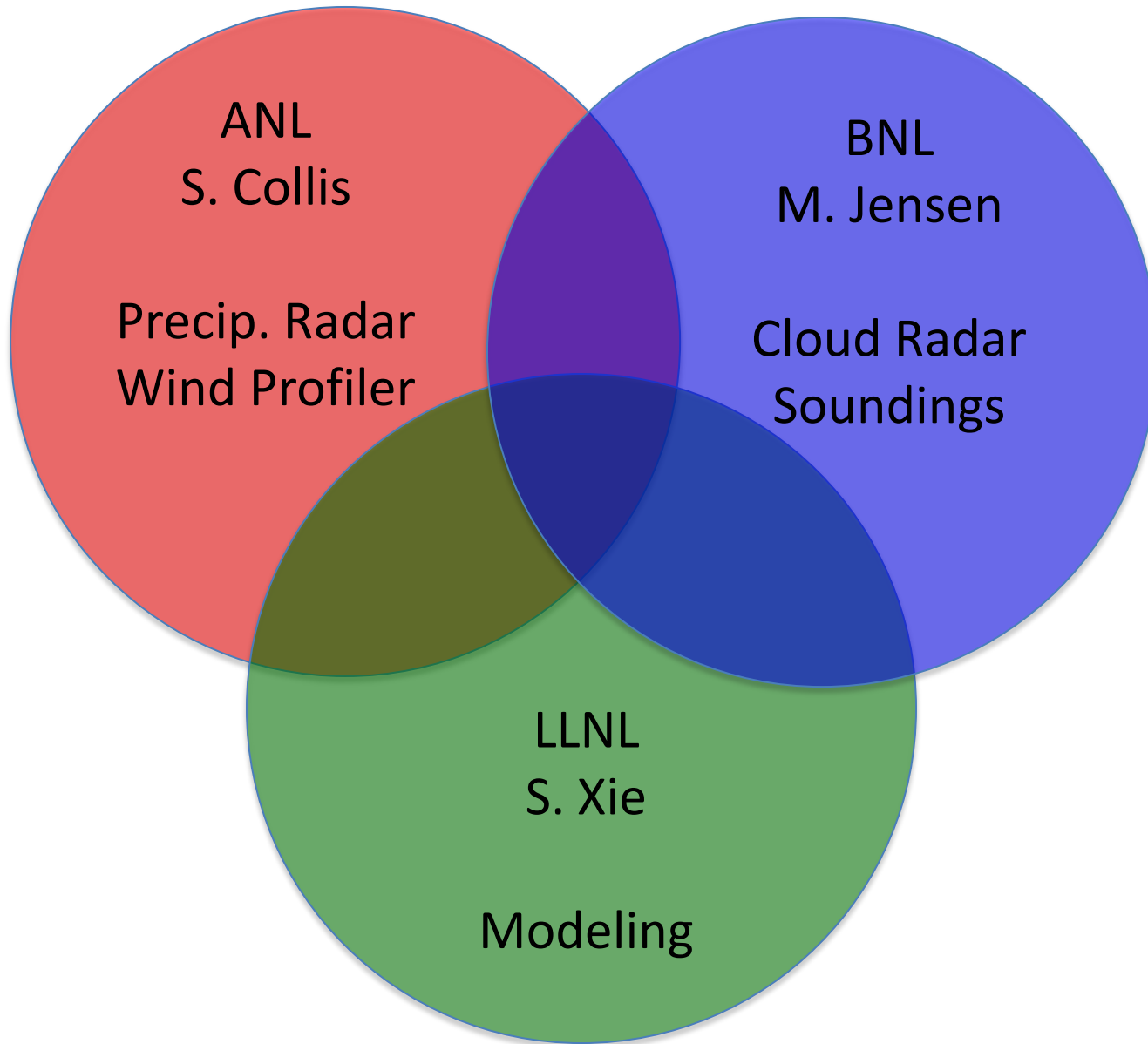MFRSRCOD, SST

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VAP Manager

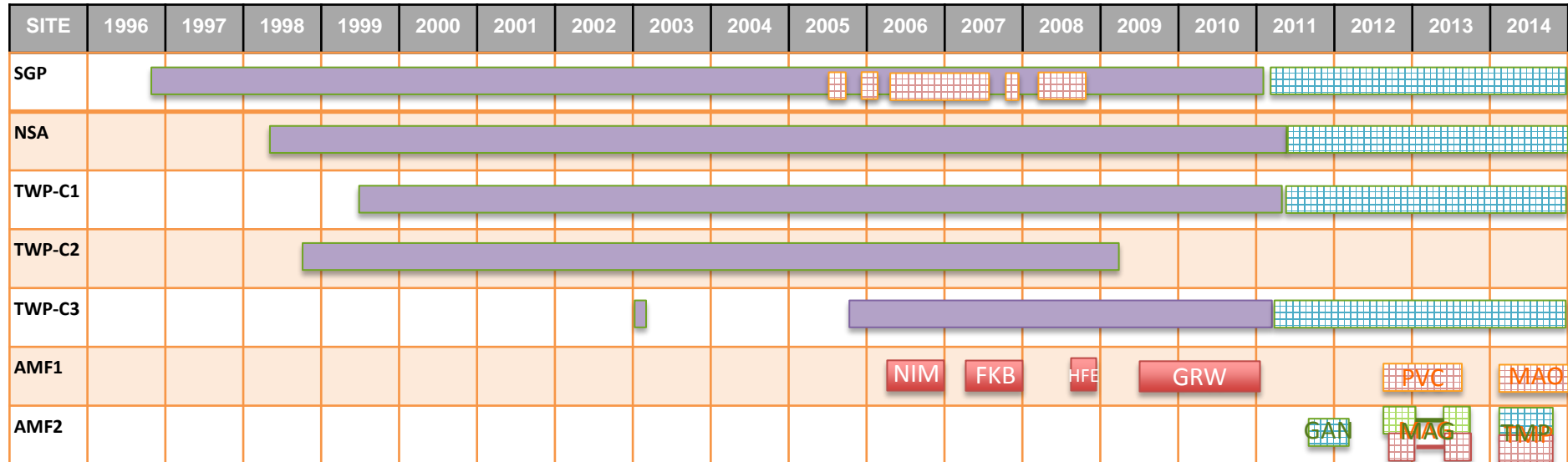**Rob Newsom**
Lidar mentor

MJ Bartholomew
MAGIC VAPS

# Cloud Lifecycle VAP Development Teams

Active Remote Sensing of CLouds (ARSCL)

SITE	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
SGP																			
NSA																			
TWP-C1																			
TWP-C2																			
TWP-C3																			
AMF1										NIM	FKB	HFE	GRW				PVC		MAO
AMF2																GAN	MAG		TMP

Developers: K. Johnson, D. Troyan, M. Wang

Provides: Cloud boundaries
Radar reflectivity estimates
Vertical velocities
Doppler spectral widths

20110520
ARSCL-KAZR Reflectivity Best Estimate

* **Cloud base**   dBZ

−70 −60 −50 −40 −30 −20 −10   0   10   20
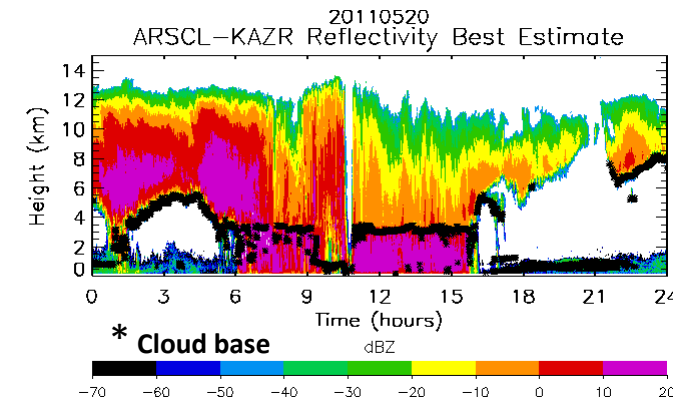
Historical MMCR-ARSCL processing complete!

Priorities for FY 2014 (as of 11/4/13)

1) Produce a SACR Corrected Moments VAP
- Release as an Evaluation Product

2) KAZR-ARSCL
- Move to production for all permanent sites
- KAZR-ARSCL for MAGIC (depends on ship corrections)

3) Complete Historical ARSCL
- Goal to complete by end of calendar year

4) KAZRSHIPCORR (MAGIC)
- Extend to MPL, HSRL, CEIL
- More rigorous treatment of horizontal wind contribution
- Move from evaluation to archive

5) INTERPSONDE
- Move to production by end of calendar year

6) WACR-ARSCL
- Release Azores dataset
- WACR-ARSCL for MAGIC (depends on ship corrections)

7) Drizzle VAP
- Drizzle rate, drizzle water content, effective size

Priorities for FY 2014 (as of 3/7/14)

1) KAZR-ARSCL
- Move to production for all permanent sites **[late Spring]**
- KAZR-ARSCL for MAGIC (depends on ship corrections)
- **V2 – incorporates micro-ARSCL, UAZR, Raman Lidar**

#31

2)) Produce a SACR Corrected Moments VAP (with ANL)
- Release as an Evaluation Product **[late summer]**

#30

3) Complete Historical ARSCL
- Goal to complete by end of calendar year **[DONE]**

4) WACR-ARSCL
- Release Azores dataset **[release imminent]**
- WACR-ARSCL for MAGIC (depends on ship corrections)

#35

5) KAZRSHIPCORR (MAGIC)
- Extend to MPL, HSRL, CEIL
- More rigorous treatment of horizontal wind contribution
- Move from evaluation to archive

6) INTERPSONDE
- Move to production by end of calendar year **[DONE]**

7) Drizzle VAP
- Drizzle rate, drizzle water content, effective size

8) Micro-ARSCL **[release imminent]**

9) **MAGIC Navigation Best Estimate**

#27

VAP Development for future:

- Historical ARSCL re-processing
- Incorporation of UAZR Observations into ARSCL
- Gridded SACR moments
- Release of VERVELSR
- Best-estimate Microphysical product
- Combined Vertical Velocity Product

Centimeter Current Work carried over from FY13

- Pushing aggressively ahead with the 915MHz column products in order to produce reflectivities in the column under precipitating conditions.
- X-SAPR Ingest done, moving to C-SAPR Ingest.
- Addressing user feedback with corrected moments VAP.
- Pushing QPE towards production.
- Continued support and development of Py-ART
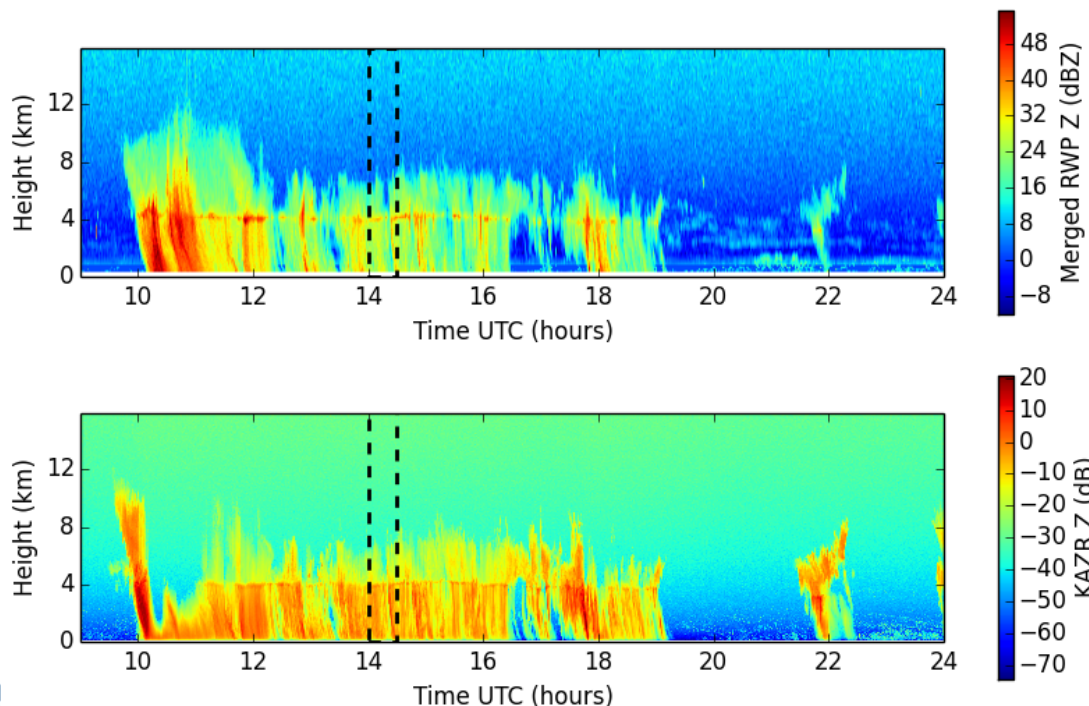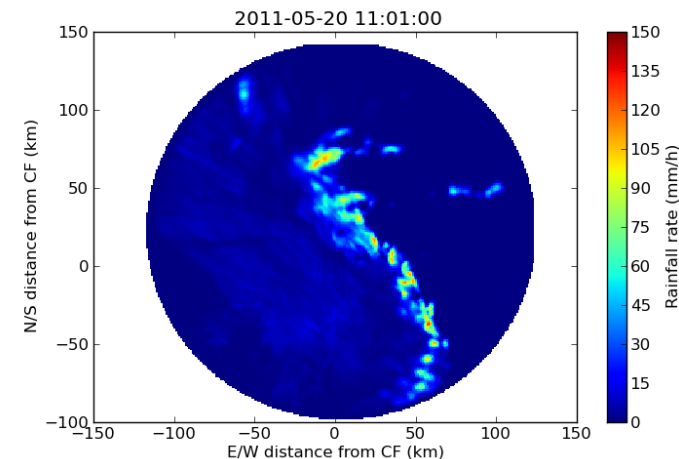
New work for FY14

- Corrected moments 2.0. This involves a pre-processing stage that identifies echo type before corrections are applied allowing better isolation of clutter and non-meteorological contamination.

- Working with McGill to get vertical velocities towards production.

- Branching out to other data sources to create best estimate products over wide domains.
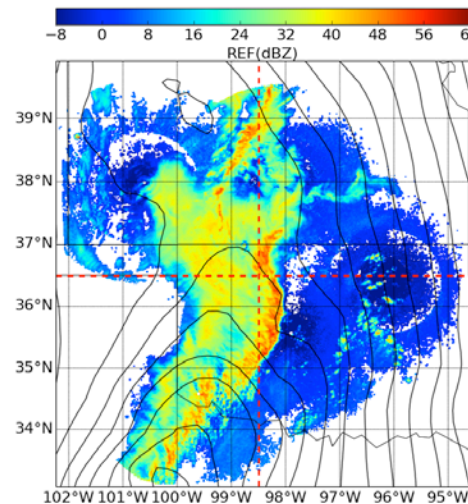
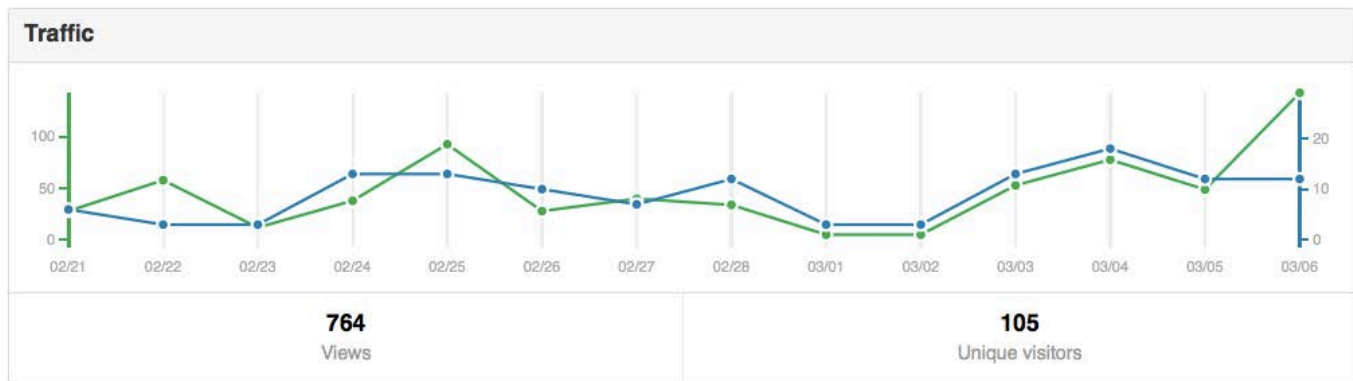Sliced at 2500.0 meters at 10:02 Z on 2011-05-20
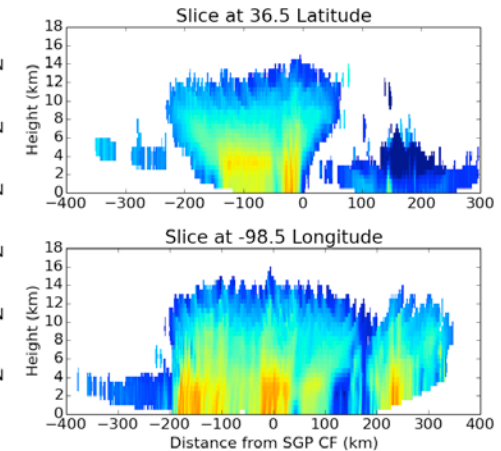
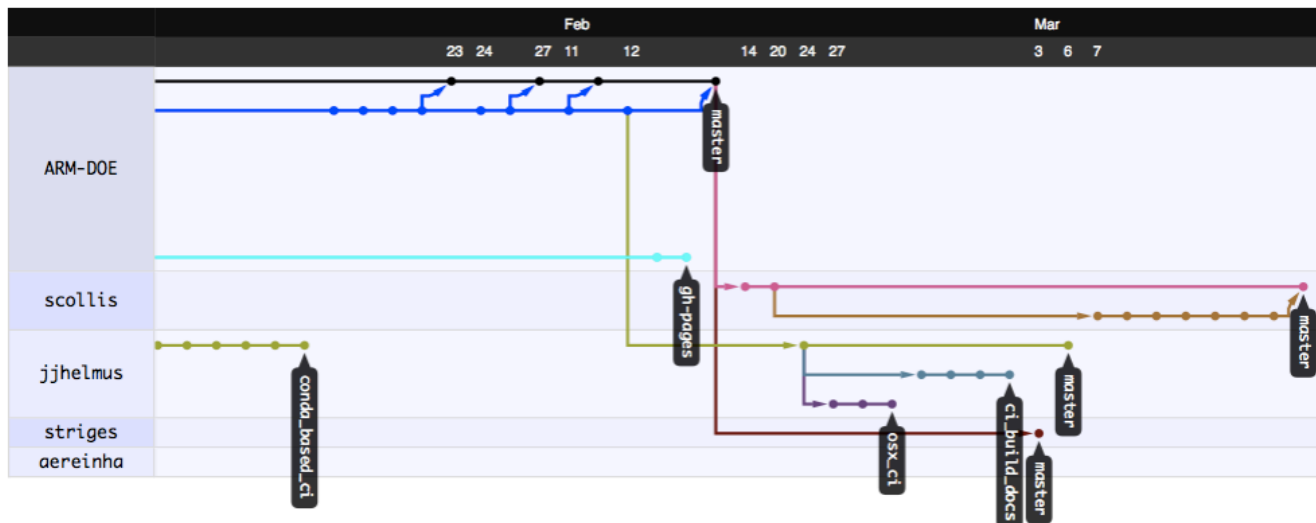RHI xsapr-nsar1 2013-12-03T14:19:36Z Azimuth 186.72
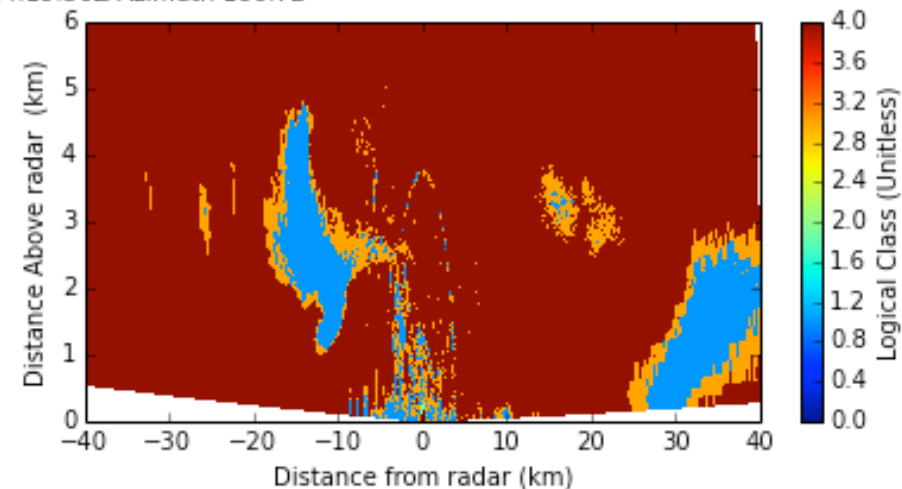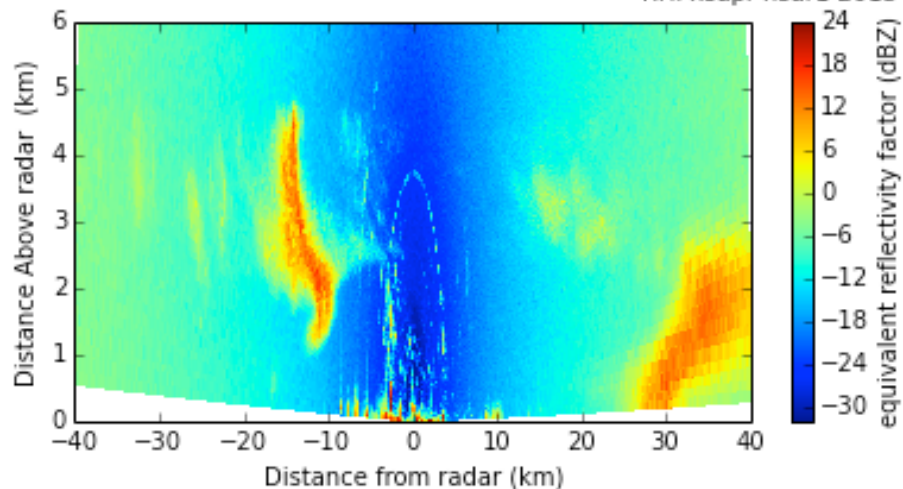
The Python ARM Radar Toolkit

- Rapid growth!
- Open source short course at the European Radar Conference. Part of an evolving ecosystem in collaboration with US and international participants.

ARM Cloud Modeling Data – Update
S. Xie, R. McCoy, Y. Zhang, Q. Tang, X. Chen (LLNL)

ARM Best Estimate Data Products (ARMBE)

- ARMBE land dataset (ARMBELAND) for L-A interactions – released

- ARMBE for China and Azores AMF deployments - to be released

- Updates to ARMBEATM and ARMBECLDRAD – released

- ARMBE 2D-gridded/station-based surface products for SGP – ongoing effort

Large-Scale Forcing Dataset

- Ensemble forcing data for MC3E – released

- Forcing for AMIE-Gan – recently updated with new SMART-R precipitation

- High resolution forcing for RACORO – May 2009, 10 mb/150km.

- Sounding based forcing for DYNAMO/AMIE – start soon

Other Data Products – ACRED, QCECOR, UQ-MICROBASE

See the poster by McCoy et al. "Update on LLNL ARM VAPs for Cloud Modeling Studies" on Wed 2 - 4 pm Room #1 Poster # 32

Focus #1: Addressing the Uncertainty in Key Modeling Data Products

- **Creating ensemble forcing products by considering uncertainties in surface precipitation**

Ensemble Forcing for MC3E

20 May 2011

Ensemble Precipitation rates

Days since 00Z 19 May, 2011

Omega

Q1
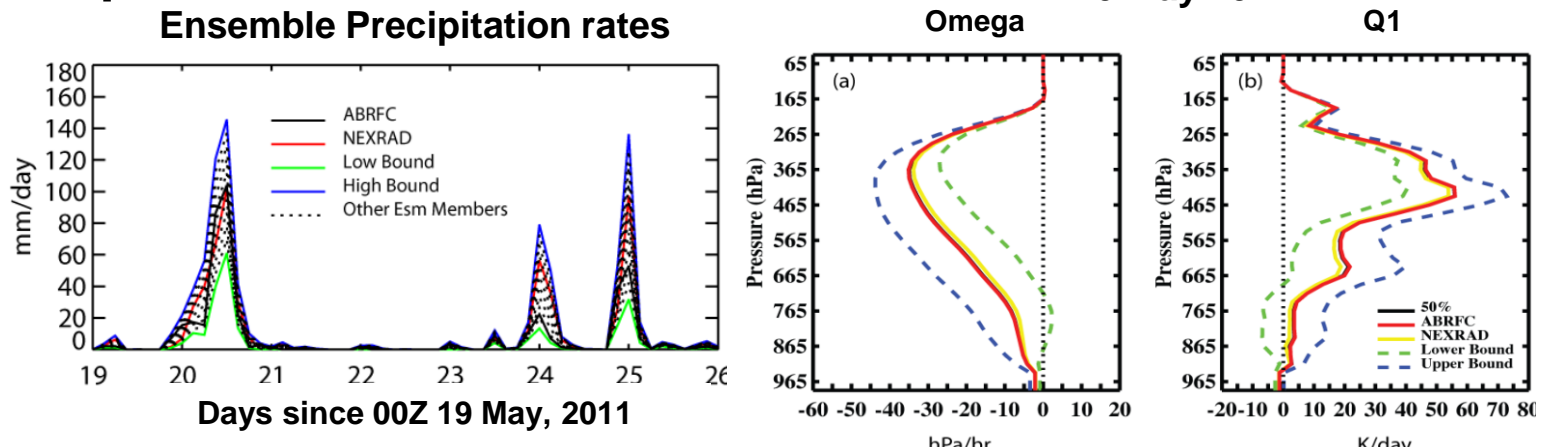
Xie et al. 2014 ASR poster Tues. 4-6pm rm #23

- **Providing an error bar to MICROBASE cloud retrievals**

PDF of Retrieved LWC at 5km on 05/10/2006

Considering errors in input files and uncertainties in algorithm parameters

*Tang, Chen, Xie (2014) ASR poster, Tues, 4-6pm RM #1*

Time (hr)
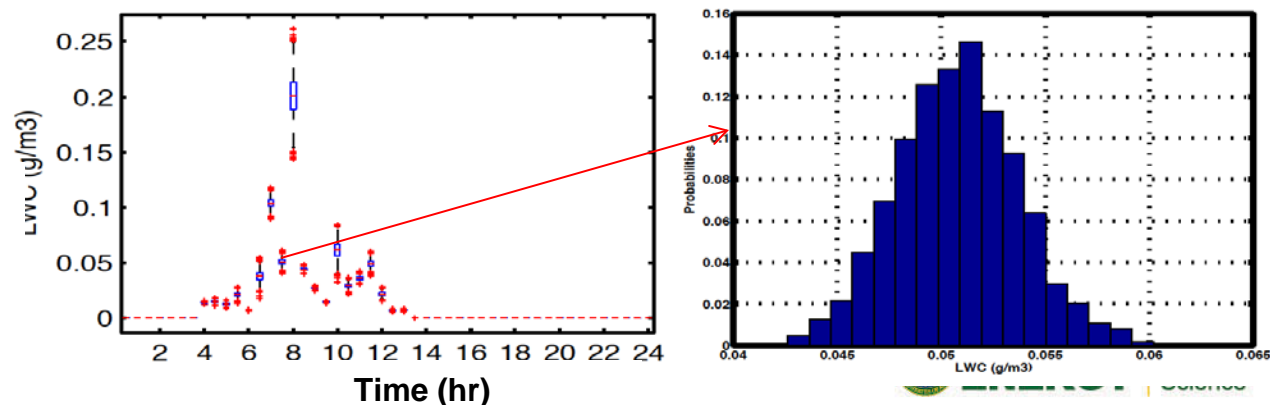
#2: Providing Hi-Res Surface, Land, and Forcing Data for Cloud Modeling and L-A Coupling Studies

- **Developing ARMBE – 2D Gridded and Station-Based Data Products at SGP**

  - **ARMBE-LAND at CF (1996 – 2012) – Released!**

  - **A 0.25x0.25 (deg) gridded surface dataset at SGF**
    - *Surface fluxes, land properties, surface met. clouds*

  - **A station-based surface dataset at SGP**
    - *No interpolation*

- **Producing 3D forcing products (Prof. Minghua Zhang – Stony Brook University)**

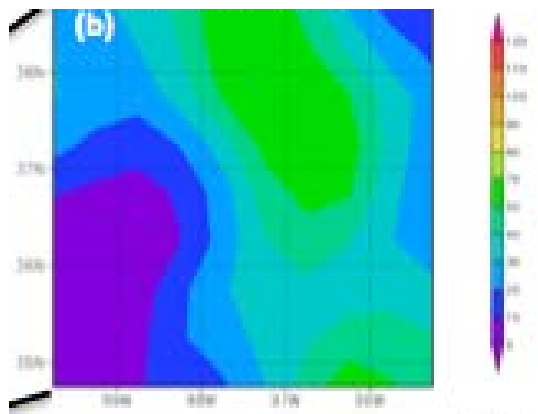**ARMBE-LAND Used in Studying the Warm Bias in Summer over U.S.**
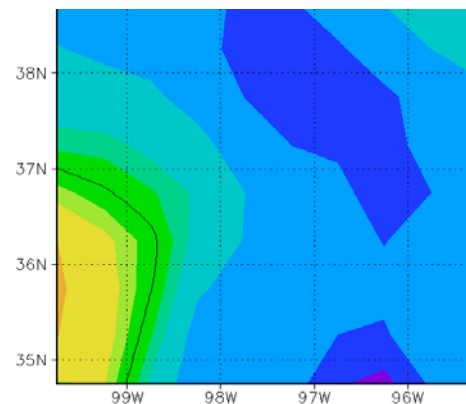
ARM SGP 10 cm Soil Moisture

Time (Jun 1 – Aug. 31, 2008)
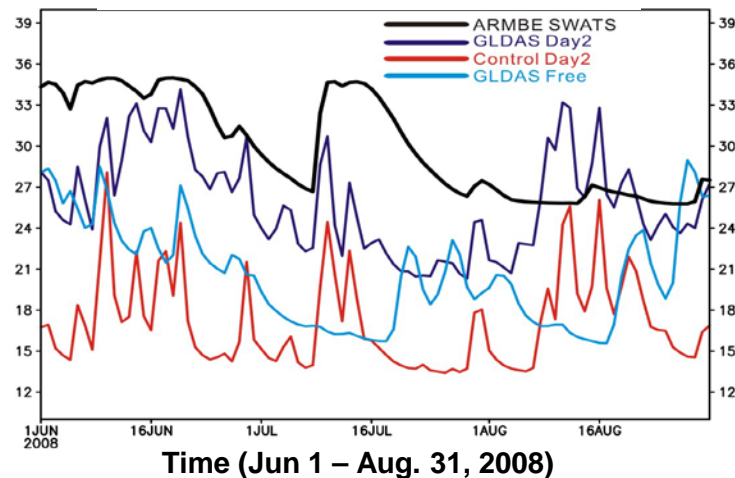
Ma et al. 2014, ASR Poster, Wed 2-4, rm #21

00Z 3 Mar 2000
0.5 x0.5 (deg) at SGP

Rainfall

700 mb Omega

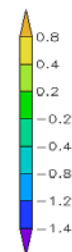*Tang, Zhang, Xie (2014), ASR Poster, Wed, 4-6pm, RM #1*