

# Value-Added Product Highlights from the Cloud Lifecycle Working Group

M. P. Jensen<sup>1</sup>, S. Collis<sup>2</sup>, S. Xie<sup>3</sup>, K. L. Johnson<sup>1</sup>, M. Dunn<sup>1</sup>, Y. Zhang<sup>3</sup>, R. McCoy<sup>3</sup>, D. Cook<sup>2</sup>, K. North<sup>4</sup>

<sup>1</sup>Brookhaven National Laboratory <sup>2</sup>Argonne National Laboratory

<sup>3</sup>Lawrence Livermore National Laboratory <sup>4</sup>McGill University

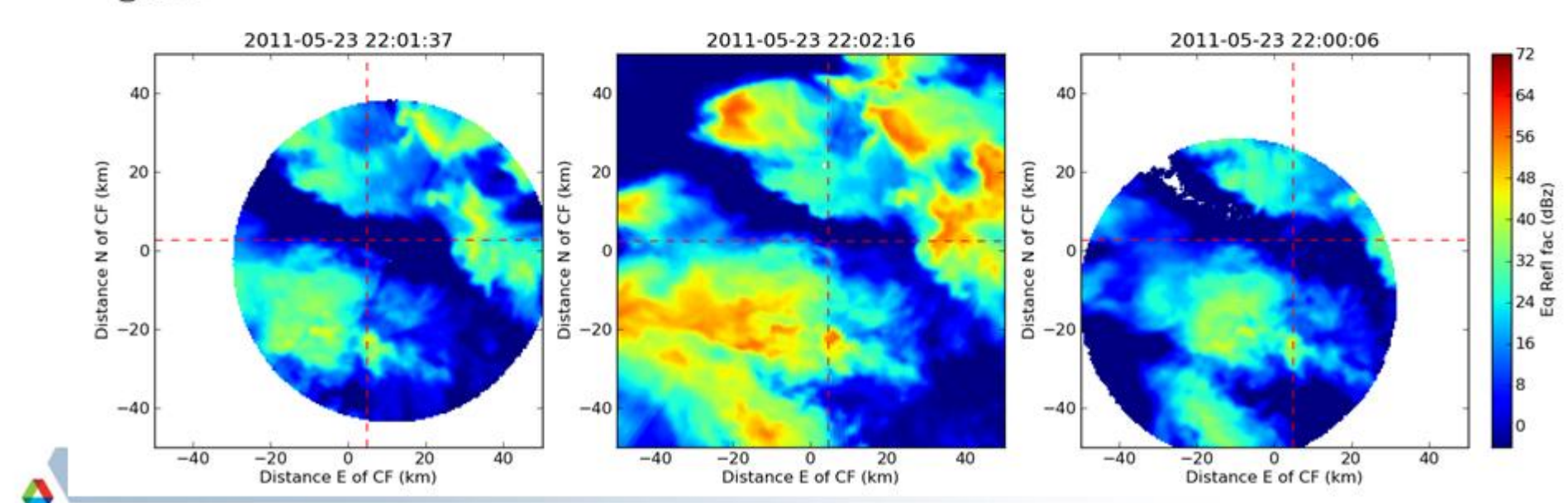
Corresponding author: Mike Jensen, mjensen@bnl.gov, (631) 344-7021



VAP name	Description	FY12 Highlights	Poster
VARANAL	SCM Forcing Data derived using constrained variational analysis approach (Zhang and Lin 1997, Zhang et al. 2001)	Completed the first version of multi-scale forcing data for MC3E and the ensemble forcing for AMF-China. The multi-scale forcing data for the 1997 SGP summer IOP and 2000 SGP spring Cloud IOP nearly complete.	Xie et al.
ACRED	ARM Cloud Retrieval Dataset – multi-year cloud microphysical property ensemble dataset	Completed the first version of ACRED, which contains nine different cloud retrievals over the 5 ARM permanent research sites: SGP, NSA, and TWP C1-C3.	McCoy et al.
CMBE	Cloud Modeling Best Estimate – Best estimate of several selected cloud, radiation and atmospheric quantities	Completed enhanced CMBE data for SGP, NSA, and TWP-C1, C2, and C3 sites.	McCoy et al.
CMAC	Corrected Moments in Antenna Coordinates	Completed algorithm development and deployment of Evaluation Version 0.1 at the ARM Data Cluster. File format closely matches SACR ingest. MC3E data available April 2012.	
ARSCL	Combines observations from MMCR/MPL/CEIL to determine best estimate cloud boundaries, radar reflectivity, Doppler velocity and spectral width.	Completed catch-up processing at SGP, NSA, TWP-C3 for entire MMCR record. TWP-C1 and TWP-C2 nearly complete.	
WACR-ARSCL	Same as ARSCL but for WACR/MPL/CEIL	WACR-ARSCL as evaluation product for NIM, FKB, HFE, GRW, SGP. Testing of insect clutter mask at SGP.	
KAZR-ARSCL	Same as ARSCL but for KAZR/MPL/CEIL	Implementation plan written, development begun, initial product expected May 2012	Johnson et al.
Micro-ARSCL	Provides detailed summary of the characteristics of the radar Doppler spectra	Ported to run efficiently on BDS. Expanded to WACR, KAZR, SACR, RWP.	
SACR VAPS	Value-added products from the Scanning ARM cloud radar systems	Prototype velocity de-aliasing, attenuation correction and significant detection masks algorithms	
MERGE SONDE	Combined radiosonde, sfc. Met, MWR and ECMWF providing high resolution profiles of atmospheric state	Released to Data Management Facility for processing	Troyan et al.
SONDE ADJUST	Application of corrections (e.g. Milosevich et al. 2011) to Viasala radiosonde humidity profiles	Released and available as Evaluation Product. Initial feedback being addressed.	Troyan et al.
INTERP SONDE	Radiosonde profiles interpolated to high time resolution for use as input to near real-time radar retrieval algorithms	Subroutine within Merged Sounding. Prototype output available to Beta-users for MC3E	Troyan et al.
MICROBASE	Radar-based estimates of LWC, IWC, R <sub>eff</sub>	Released to Data Management Facility for processing	Zhao et al.

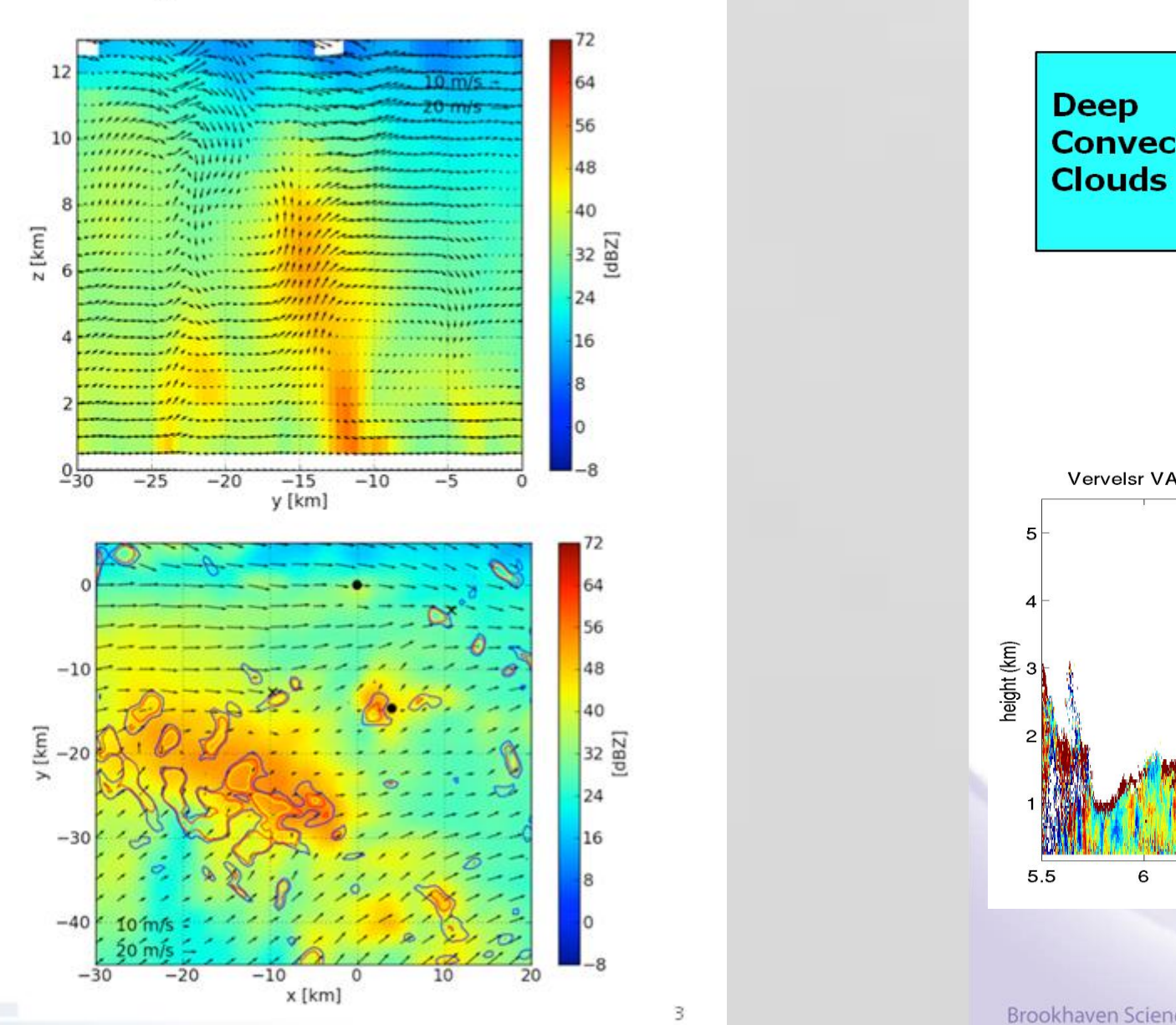
## Mapped Moments to a Cartesian Grid

- First VAP from the ARM radars.
- At the SGP this includes inner and outer grids.
- Outer grid is CSAPR on a 240x240kmx17km grid.
- Inner grid is all radars on a 100x100x17km grid.

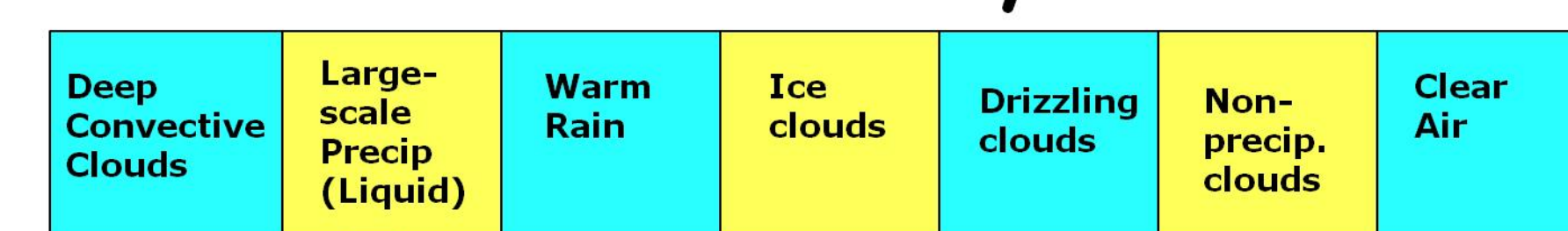


## Vertical Velocity - Deep Conv. Clouds

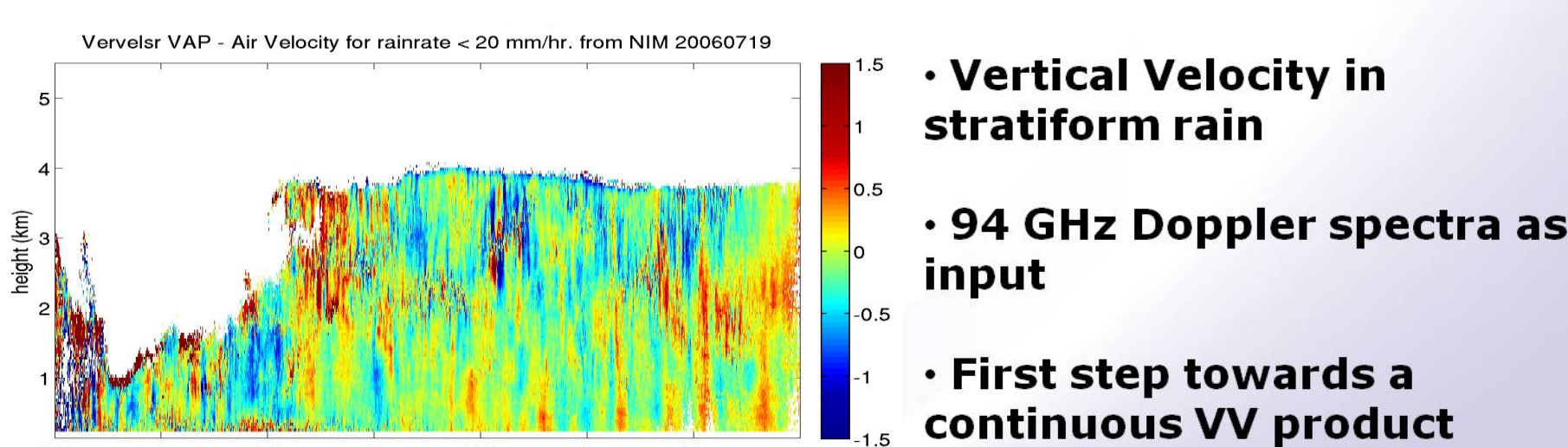
- A single radar gives you the radial velocity of scatterers away/towards the instrument.
- Combining multiple radars reveals combination of projections of u, v and w.
- The projection of w onto radial velocity is small so a variational algorithm is used that leverages anelastic mass continuity as a constraint.
- Initial retrievals using the Southwest and Southeast X band systems and the X-SAPR show promise.



## Vertical Velocity VAPs



Giangrande et al. 2010  
Developer: M. Dunn  
ECO-00804

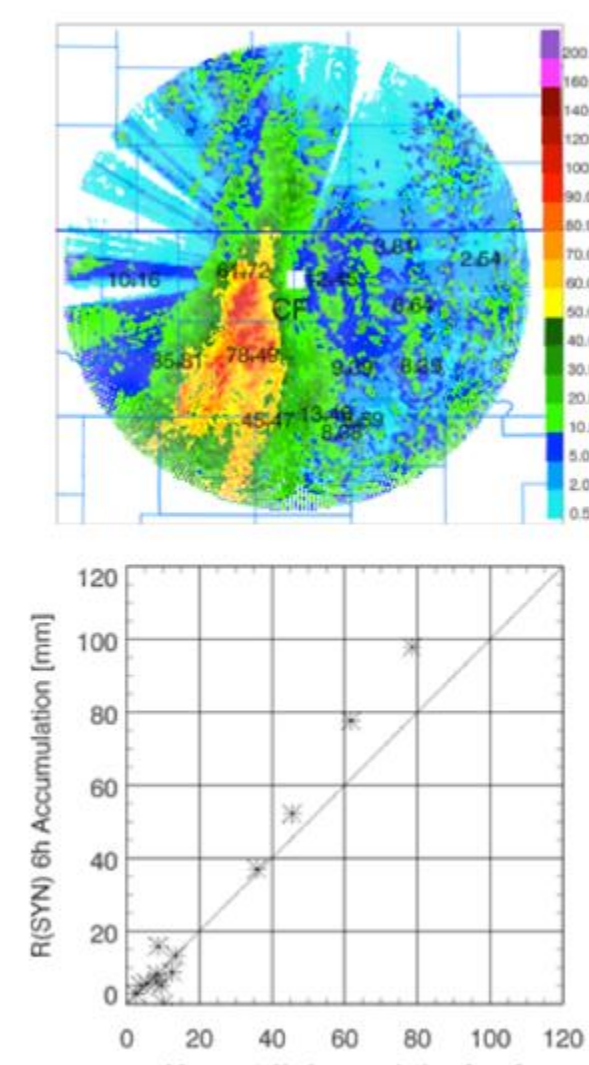


- Vertical Velocity in stratiform rain
- 94 GHz Doppler spectra as input
- First step towards a continuous VV product

Brookhaven Science Associates

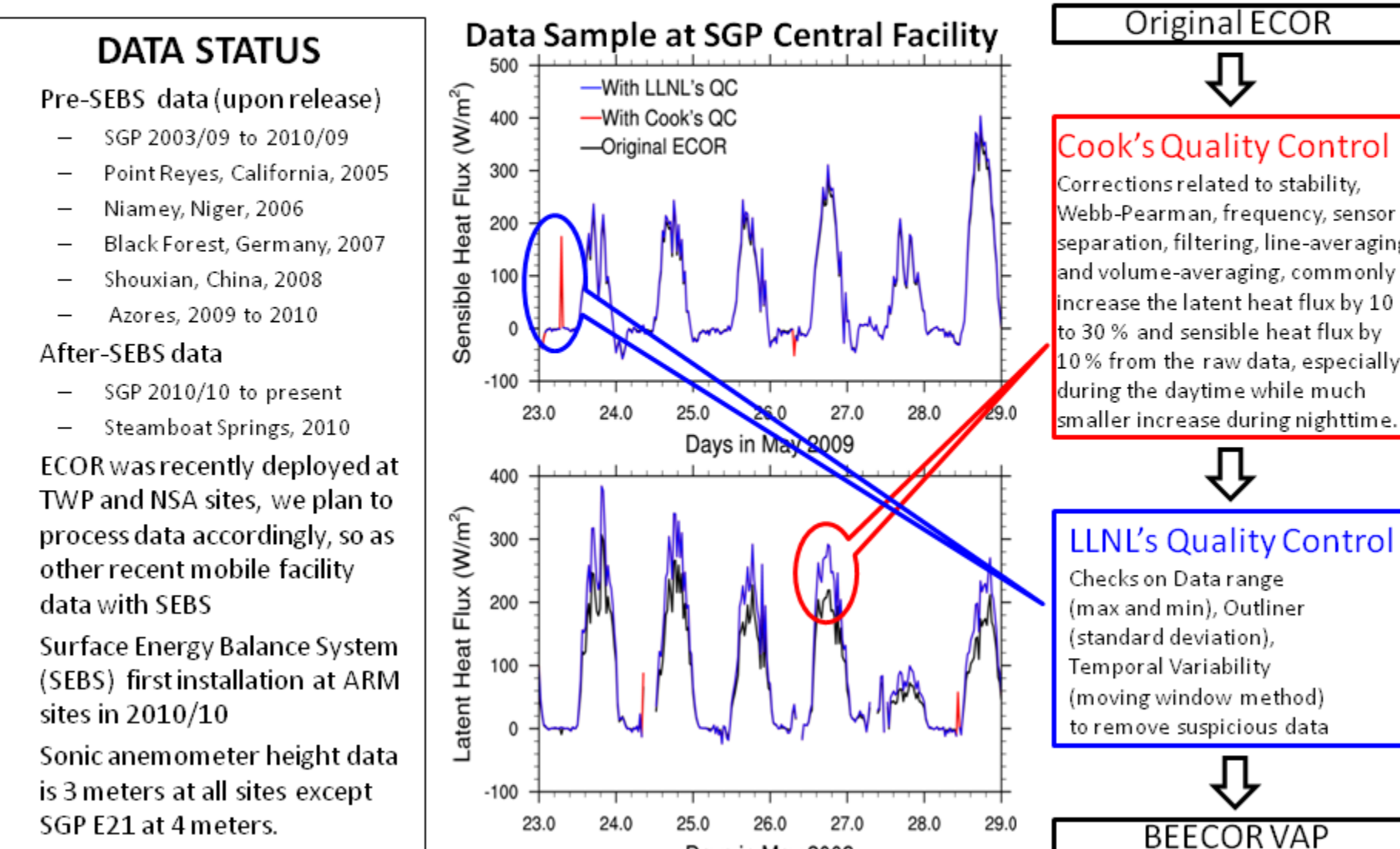
## Quantitative Precipitation Estimate

- Used attenuation corrected reflectivity and recalculated specific differential phase.
- In areas of very high rainfall reflectivity is affected by attenuation, so we use non-attenuated specific differential phase.
- Being the derivative of a moment, specific differential phase is very noisy in low rainfall so in these regions we use reflectivity.
- Early comparisons with the Oklahoma Mesonet show promise!



## Best Estimate ECOR VAP

Yunyan Zhang, Renata McCoy, Shaocheng Xie (LLNL) and David Cook (ANL)



## Scanning Cloud Radar Products

