

Cloud Lifecycle Value-Added Products

- Progress, Current Status, Future Plans

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ASR Cloud Lifecycle WG Breakout

31 March 2011

San Antonio, TX

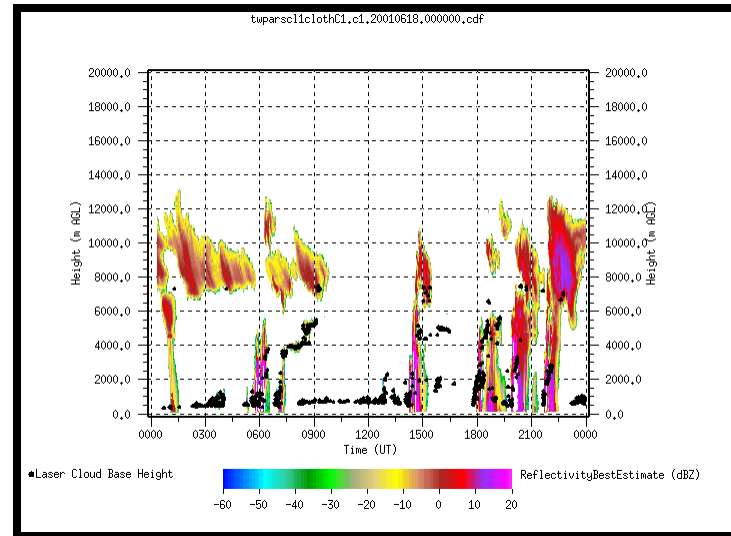


Active Remote Sensing of Clouds (ARSCL)

Developers: Karen Johnson, David Troyan

Provides:

- Cloud boundaries,
- Hydrometeor height distributions and radar reflectivity estimates
- Vertical velocities
- Doppler spectral widths



Availability at ARM Archive:

Year:	97	98	99	00	01	02	03	04	05	06	07	08	09	10
SGP	[Green bar spanning all years from 97 to 10]													
NSA		[Green bar spanning years 98 to 09]												
TWP-C1			[Green bar spanning years 99 to 05]								[Green bar spanning years 06 to 09]			
TWP-C2		[Green bar spanning years 98 to 05]										[Green bar spanning year 07]		
TWP-C3							[Green bar spanning year 03]			[Green bar spanning years 05 to 10]				

WACR - ARSCL Evaluation Product:

Brookhaven Science Associates
NIM, FKB, HFE, GRW available, SGP underway

ARSCL (cont.)

Recent Activities:

- Incorporated MPL cloud mask product from Lidar group
- TWP processing through Year of Tropical Convection period
- Initial development of KAZR-ARSCL
- Initial development of components of 3D-ARSCL
 - Attenuation correction, velocity de-aliasing, detection mask
- Reprocessing of WACR-ARSCL

Short-term Plans:

- TWP-C1 processing in support of Year of Tropical Convection
- KAZR-ARSCL as an evaluation product
- 3D-ARSCL in radial coordinates
- WACR-ARSCL for SGP, StormVex, AMF-India

Microphysical Active Remote Sensing of CLouds (MicroARSCL)

Developer - Ed Luke

Archived

SGP (BL): May 07, Jun 07, Sep 07, Oct 07, Dec 07, Jan 08, Feb 08, Mar 08, Apr 08

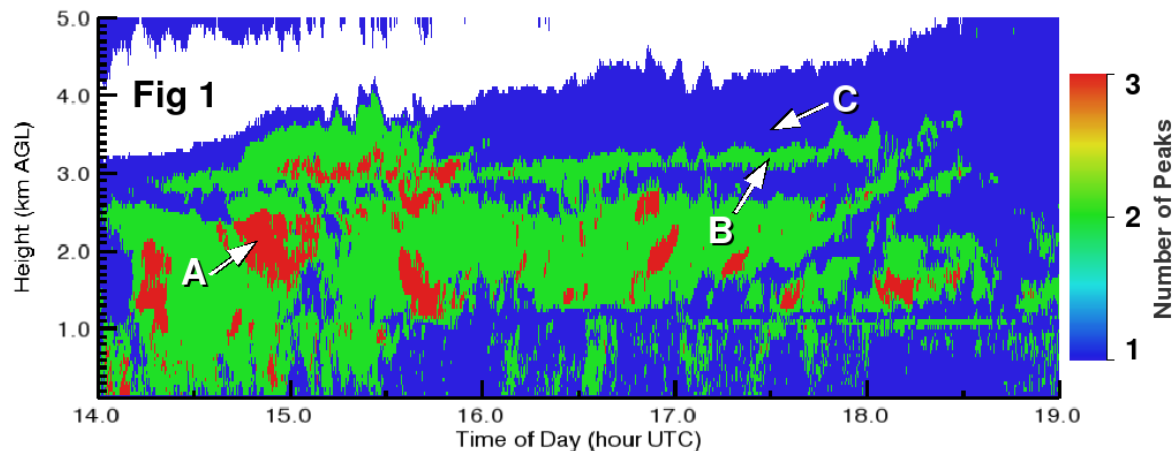
Processed *

SGP (BL): May 06, Jun 06, Sep 06, Oct 06, Dec 06, Jan 07

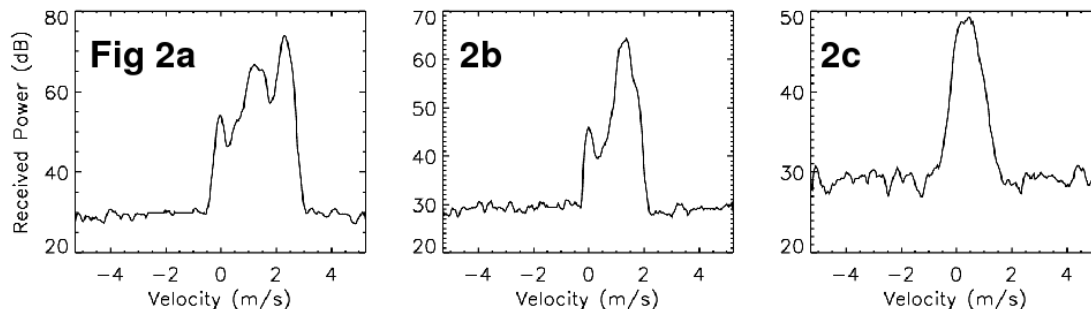
NSA(BL): Oct 04, Apr 08

TWP (BL/GE): Feb 07

Number of MMCR Spectral Peaks at SGP 20071022



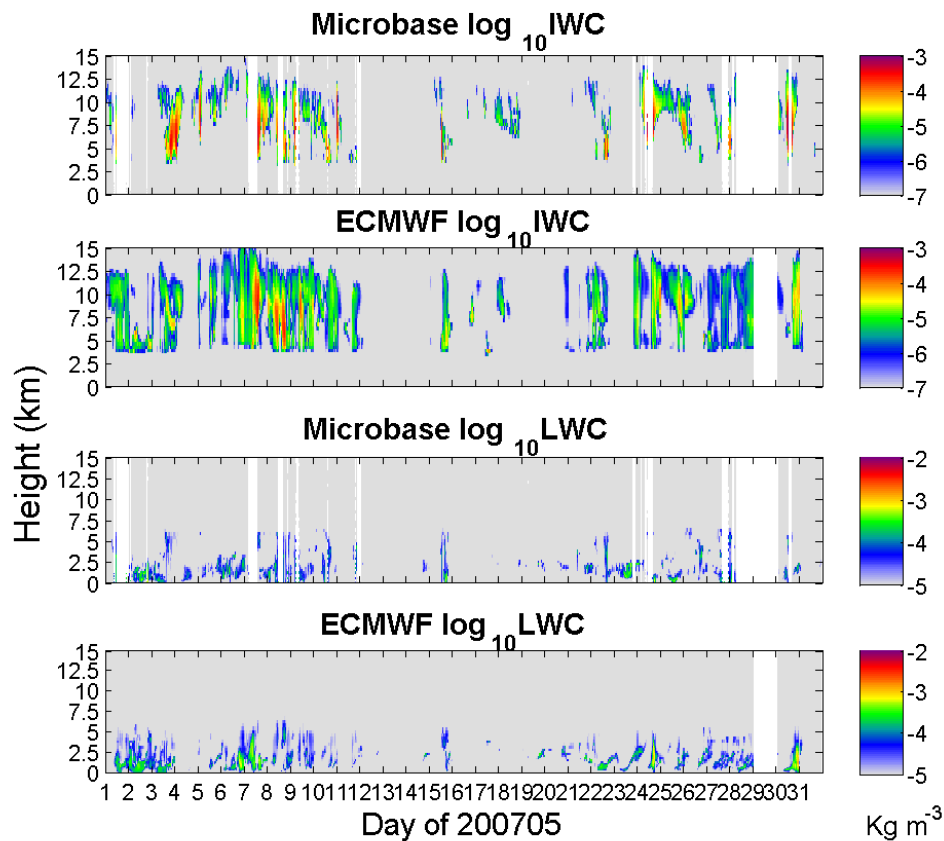
Example Trimodal, Bimodal, and Unimodal Doppler Spectra



* 100 most active days

Continuous Baseline Microphysical Retrieval (MICROBASE) [developer: M. Dunn]

- Provides time-continuous information on cloud location, liquid and ice water contents, and effective droplet sizes as a function of height (10 sec., 20 min.)
- Uses ARSCL, Merged Sounding, MWRRET with a combination of previously published microphysical parameterizations



Availability

SGP - 1998 thru 2009

NSA - 2002 thru 2007

TWP C1 - 4/00 - 5/00

1/01 - 12/07

TWP C2 - 1/02 - 12/04

TWP C3 - 1/03

11/05 - 3/06

2007

Merged Sounding (MS)

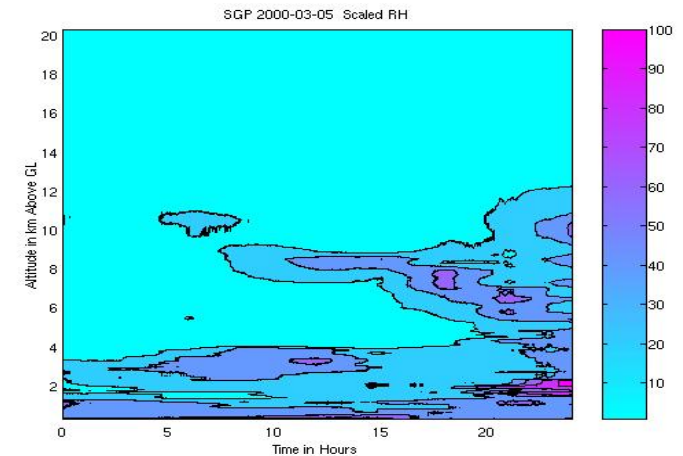
Developer: David Troyan

- Uses a combination of radiosonde profiles, MWR integrated water vapor, surface meteorology, and ECMWF model output to provide a thermodynamic profile of the atmosphere at one minute intervals

- Version 1 (available as an Evaluation Product)

- Uses ARM radiosondes without humidity corrections
- 266 Altitude Levels to 20 km AGL

SGP:	1996 - 7/2010	PYE:	2005
NSA:	2002 - 2010	NIM:	2006
TWP-C1:	2000 - 2010	FKB:	2007
TWP-C2:	2002 - 2010	HFE:	2008
TWP-C3:	2002 - 2010	GRW:	2009-10



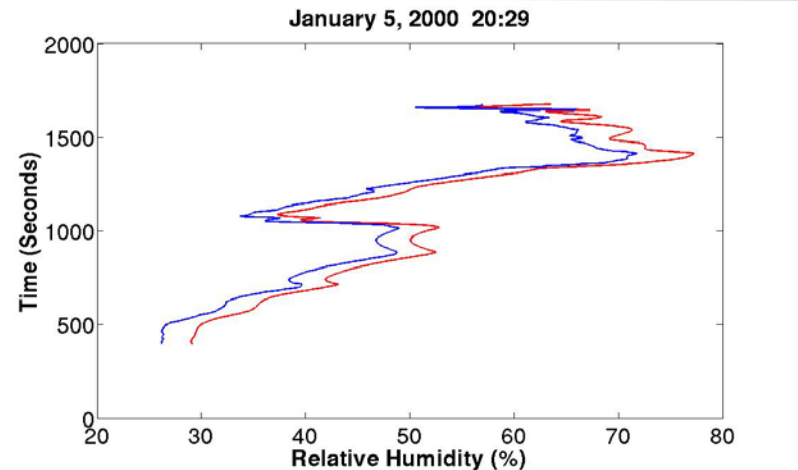
- Version 2

- Uses ARM radiosondes corrected for using Miloshevich method
- 315 Altitude Levels to 60 km AGL
- Beta version SGP 2002-2009 (soon evaluation product)

Sonde Adjust (Temporary Name)

Developer: David Troyan (troyan@bnl.gov)

- Corrects the dry-bias found in Vaisala radiosondes
- Employs the correction algorithms described in
 - Miloshevich et. al. (2001, 2004, 2006) Wang et. al. (2002)
 - Turner et. al. (2003) Vomel et. al. (2007)
- Output includes all fields required for merged sounding: pressure, temperature, winds, RH original, RH adjusted, RH Scaled by MWR integrated water vapor.
- RS-80 , RS-90, RS-92 - complete
- To be used as input into Merged Sounding
- SGP, NSA, TWP (~ 2002 - 2009)
- Available from David Troyan
- Any feedback is appreciated
- Will be released as an evaluation product soon



Plans for future work

**I. Scanning “cloud” radar VAPS
 (“precip.” radar VAPS > S. Collis)**

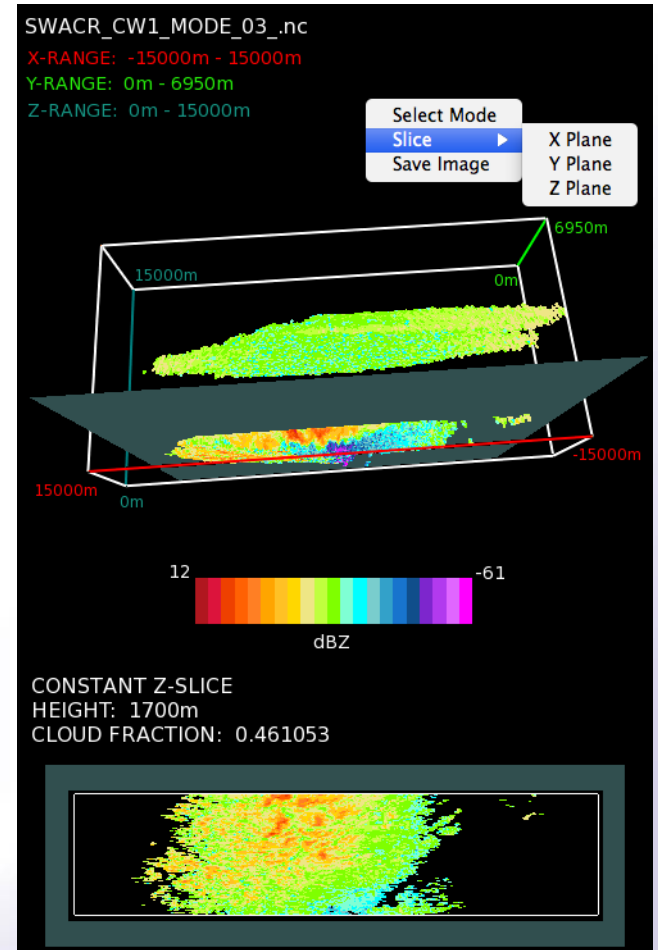
II. Vertical Velocity VAPS

III. Drizzle Property VAP

Plans for future work

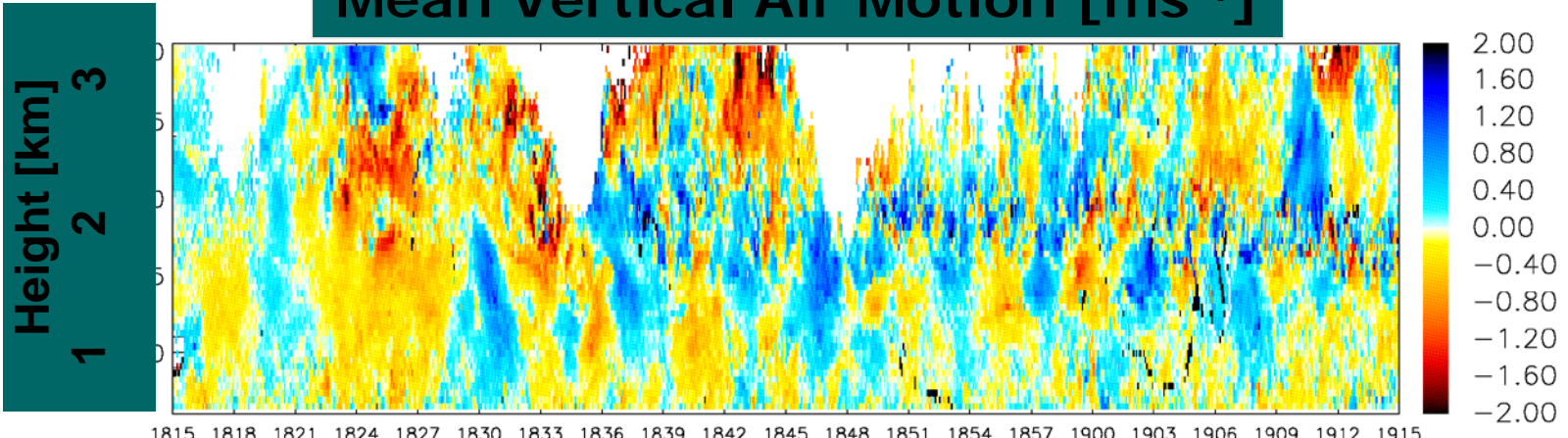
I. Scanning "cloud" radar VAPS

- Attenuation Correction
- Velocity De-aliasing
- Detection Mask
- Radial 3D-ARSCL
- Gridded 3D-ARSCL



Vertical Velocity VAPs

Mean Vertical Air Motion [ms^{-1}]



			Time			
Ice clouds	Profiling Doppler cloud radars	Profiles – Accuracy ?	Re assumption	Novel	Sp. width – Dissipation rate	
Drizzling clouds	Profiling cloud radars (spectra)	Profiles ~5-10 cms^{-1}	No assumption – Great Impact	Novel	Sp. Width – Dissipation rate	
Non-precipitating clouds	Profiling cloud radars (moments)	Profiles ~2-5 cms^{-1}	No assumption or impact	Mature	VV Skewness VV Variance Mass-flux Sp. width	
Convective BL Subcloud Layer	Doppler Lidar & Insect MMCR returns	Profiles ~5-10 cms^{-1}	No assumption Impact in falling precipitation	Mature	VV Skewness VV Variance Mass-flux	