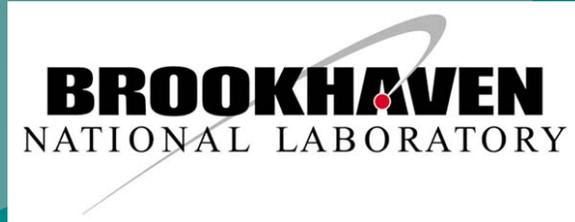


Current and future status of BBBHRP input VAPS: Merged Sounding and MICROBASE

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Pavlos Kollias, Karen Johnson, David Troyan, Ed Luke,
Maureen Dunn

ARM Instantaneous Radiative Flux Working Group
meeting

October 3, 2006 Washington, DC



Merged Sounding (MS)

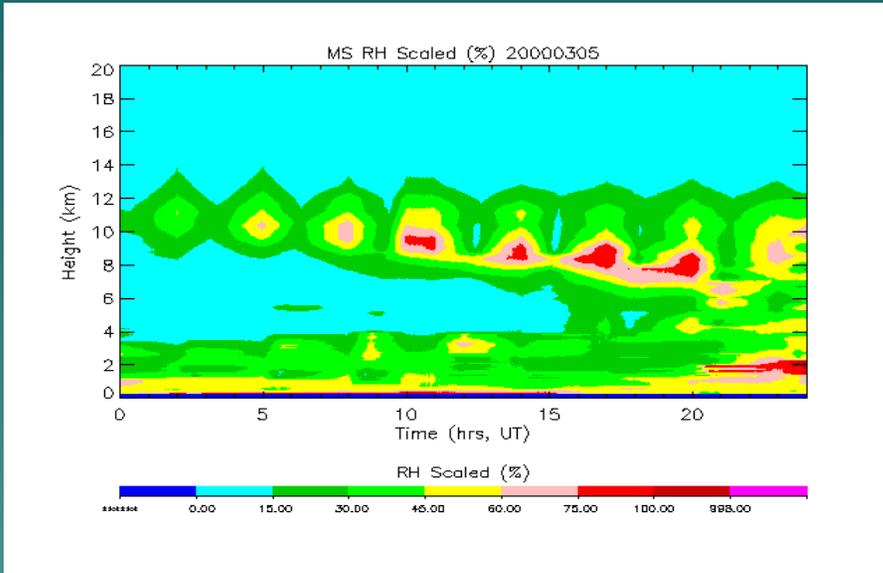
- Uses a combination of radiosonde profiles, MWR integrated water vapor, surface meteorology and ECMWF model output to provide a thermodynamic profile of the atmosphere at one minute intervals
- The current version of MS was used to meet the ARM 1st quarter metric for FY 2006 – “Complete continuous time series of water vapor for selected 30-day periods for each of the fixed ARM sites.

Methodology

- 1) “Marry” radiosonde data with ECMWF model output taking drift time of sonde into account
- 2) Allow each radiosonde profile to influence the resulting field for a specified time interval
- 3) Merge other direct thermodynamic obs into product (i.e. sfc. met, tower)
- 4) Scale column water vapor to match MWR observations

Merged sounding output

Relative humidity



- 1 minute time intervals
- 266 altitude levels (greater resolution at surface) to 20 km
- temperature
- humidity
- pressure
- horizontal winds

Availability

SGP – March 2000 (3/00 -2/01)

NSA – 3/1 -4/15/2001 (1/04-12/04)

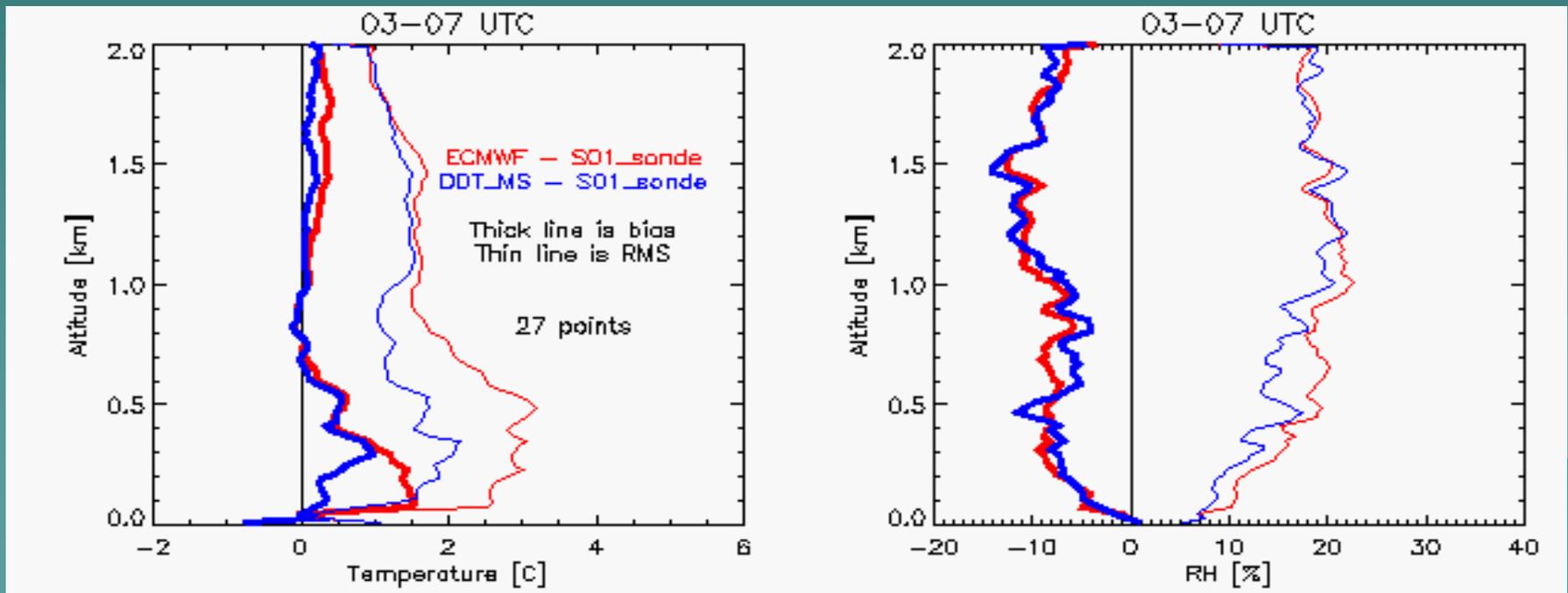
TWP C3 – January 2005 (10/04)

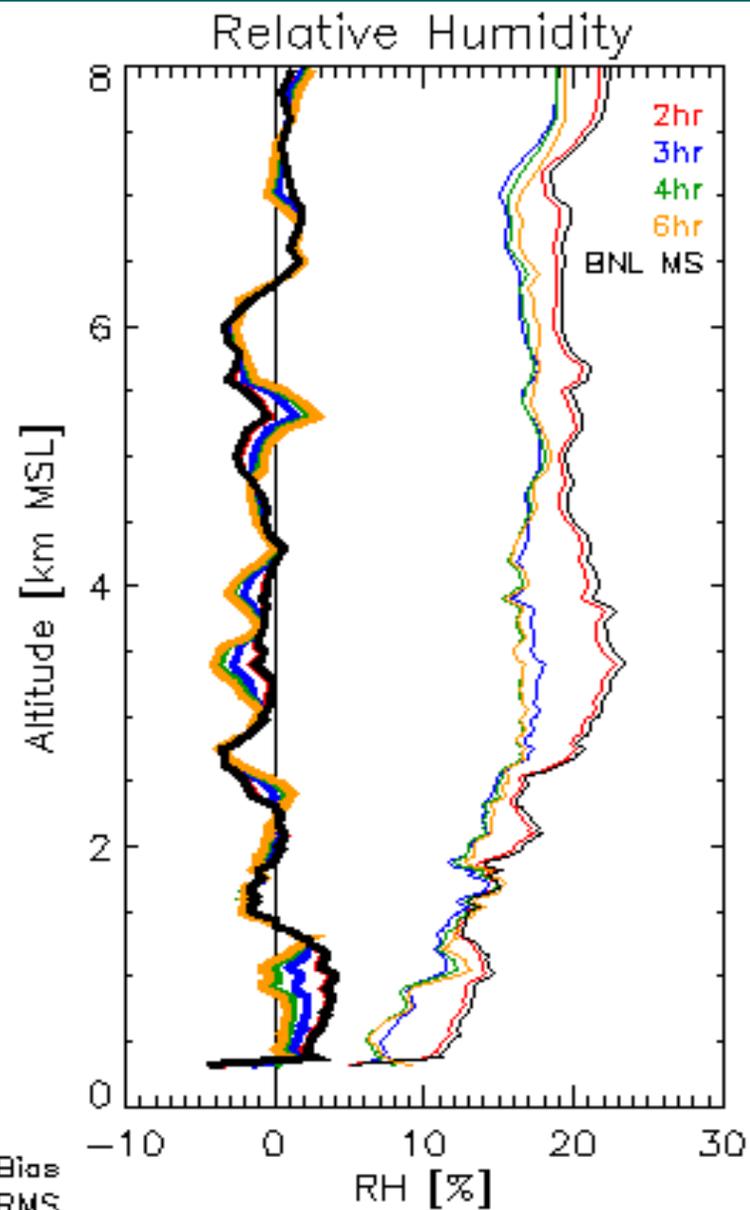
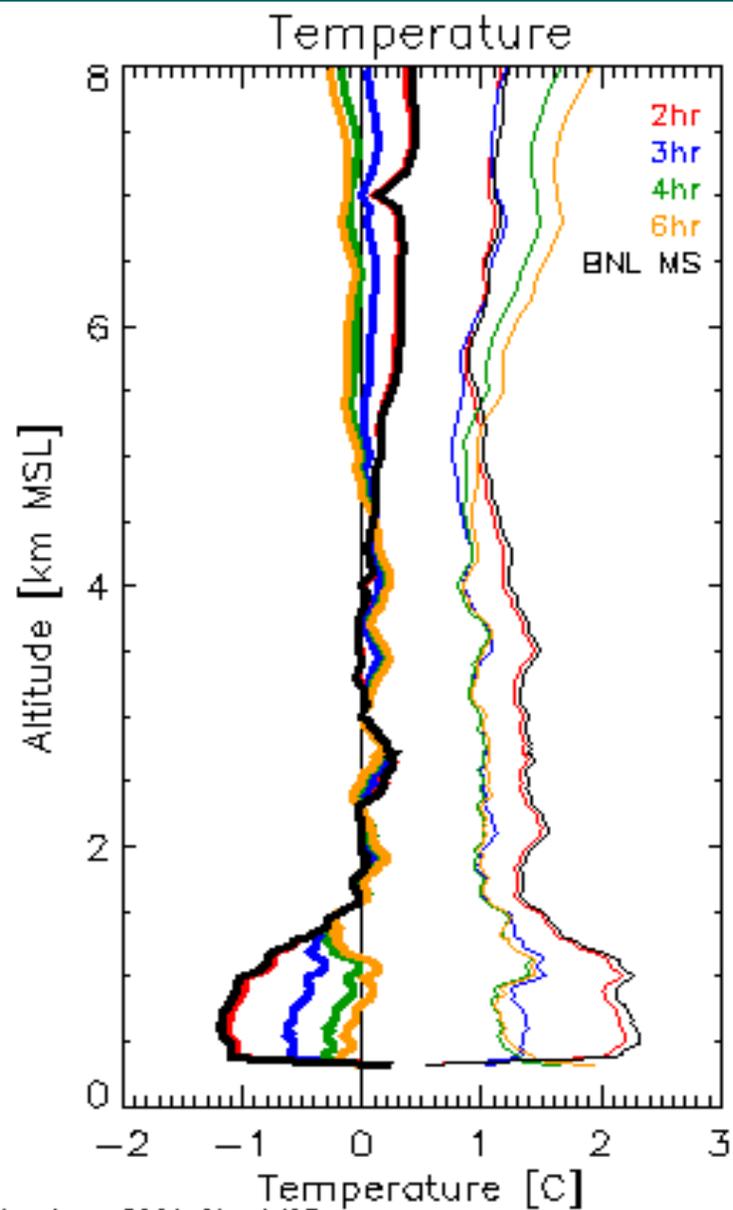
TWP C1 – (2/00-7/00, 10/04)

TWP C2 – (3/99 – 12/99, 10/04)

Turner Merged Sounding

- New function defining influence of radiosonde observations
- Additional datastreams (e.g. NSA NWS sondes)
- Limits on applicability of MWR scaling

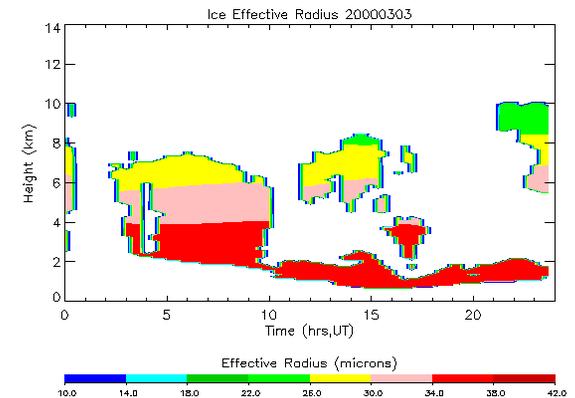
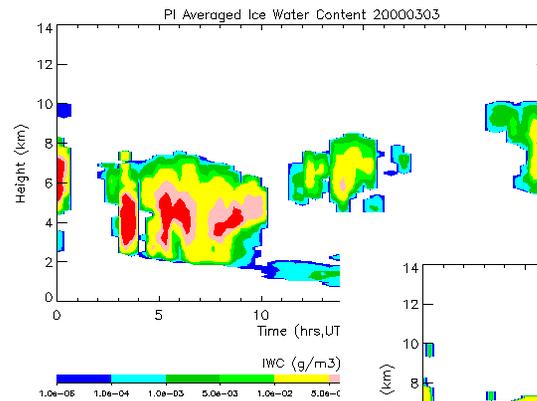
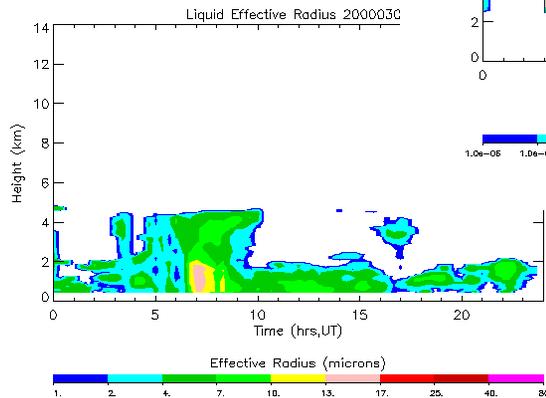
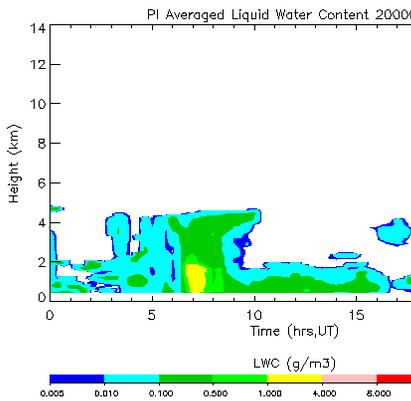




— Bias
— RMS

Continuous Baseline Microphysical Retrieval (MICROBASE)

- Provides time-continuous information on cloud location, liquid and ice water contents, and effective droplet sizes as a function of height [P_i = instantaneous, P_a = averaged]
- 4 versions (P-i)
 - (v 1.0) original version using Liao and Sassen (1994)
 - (v 1.2.2) including MWR LWP scaling
 - (v 1.2.2 Trial A) Frisch et al., 1995
 - (v 1.2.2 Trial ?) Matrasov et al., 2003 IWC, Re



This version of MICROBASE was used to meet the ARM #rd quarter metric for FY 2006 – “Produce and refine a 1-year continuous time series of cloud microphysical properties based on cloud radar measurements for each of the fixed ARM sites”

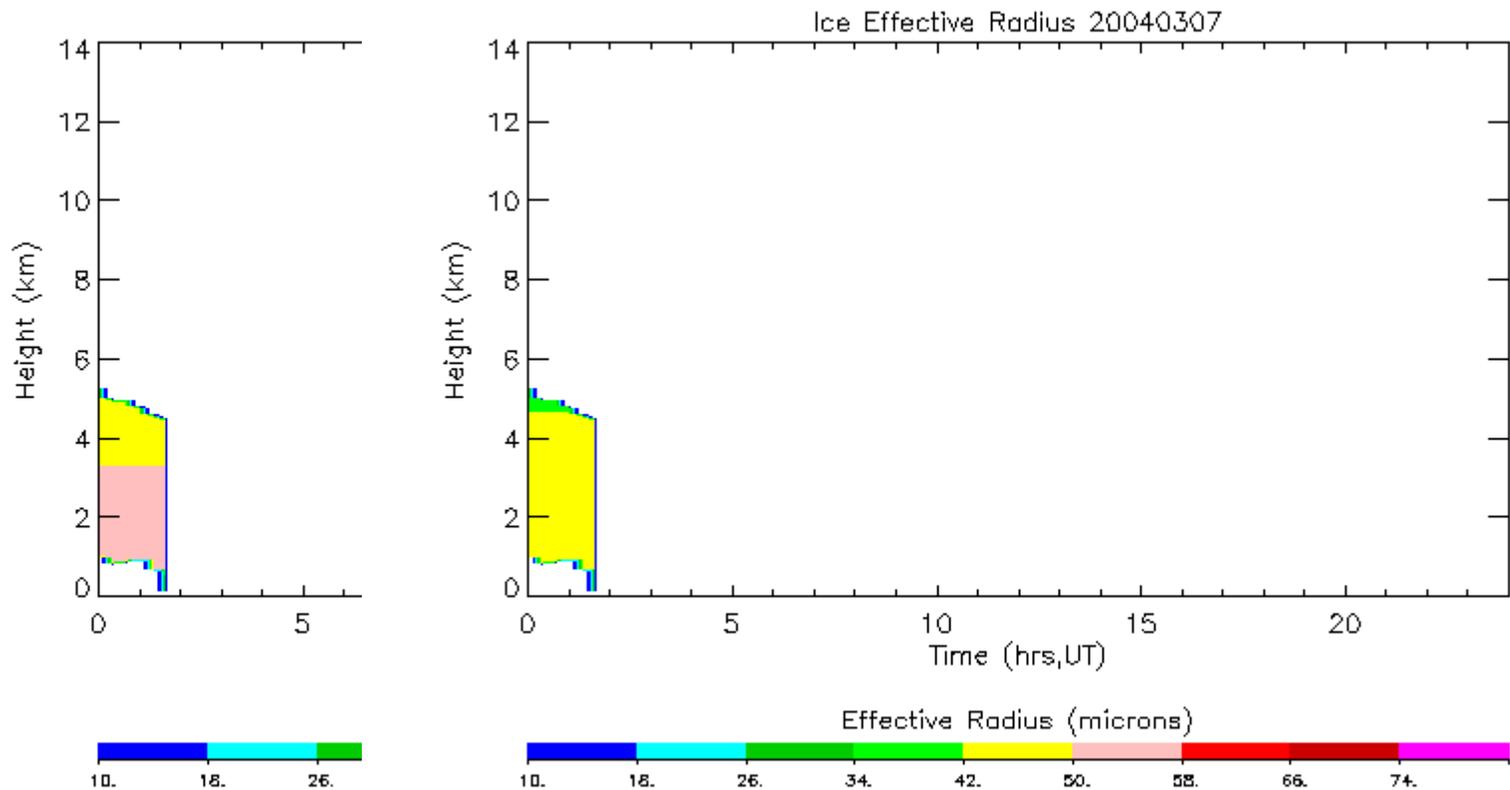
Availability –

SGP – March 2000 – February 2001

NSA – January 2004 – December 2004

TWP C1 – November 2003 – October 2004

- Recent upgrade uses Merged sounding to define temperature profiles rather than simple interpolated soundings.



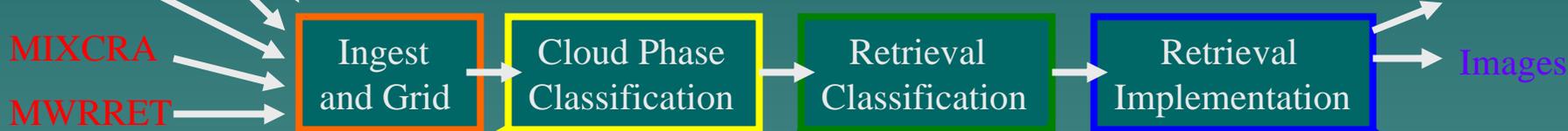
Shupe-Turner Microbase Product *(under development)*

Input Datastreams



The General Idea

Products



Multisensor Approach:
MMCR moments,
lidar backscatter/depol,
ceilometer cloud base,
MWR-AERI LWP

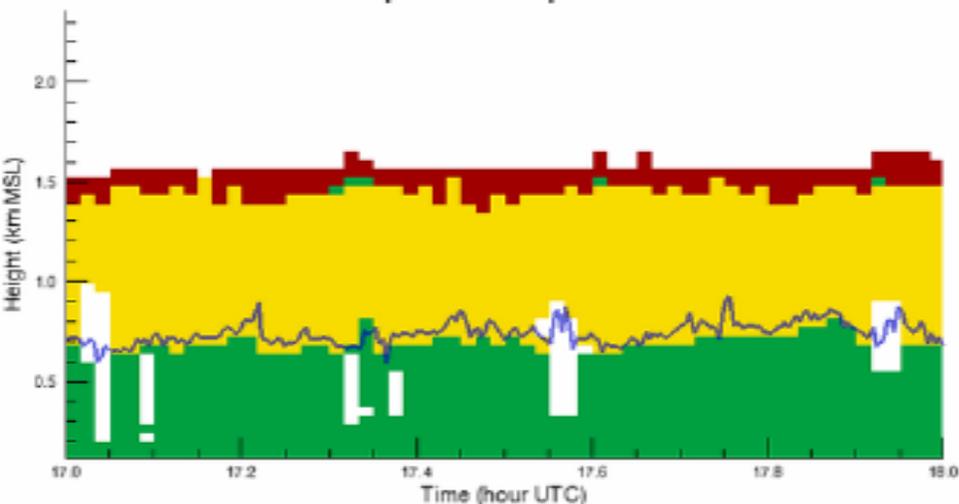
Determines which data
streams are available
and which retrievals are
appropriate for the given
cloud scene

A “smart” combination of methods:
AERI-MWR liquid/ice (Turner)
MMCR ice (Matrosov)
MMCR ice (Shupe)
MMCR liquid (Frisch)
Adiabatic liquid, LWP-scaled

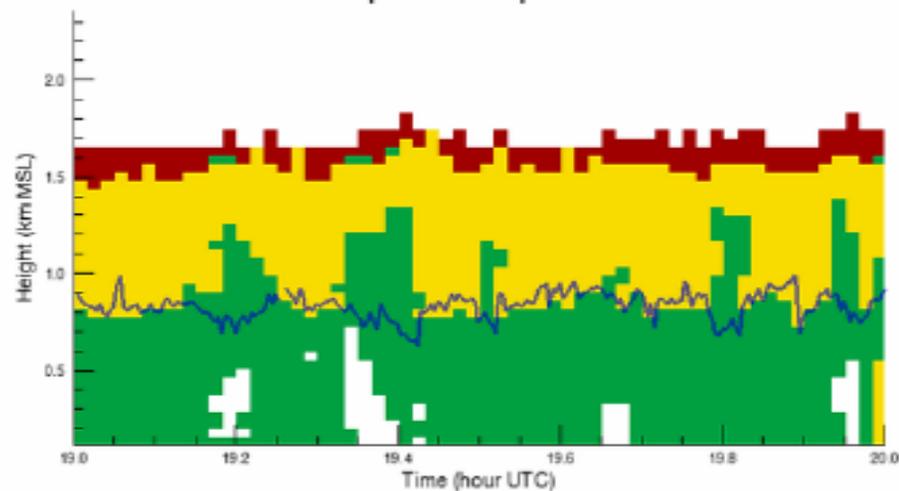
High Spectral Resolution Lidar + MMCR moments + MWR (provided by Shupe and Eloranda)

Liquid ■
Ice ■
Mixed ■

NSA 20041009 Shupe Solid/Liquid/Mixed Classifications

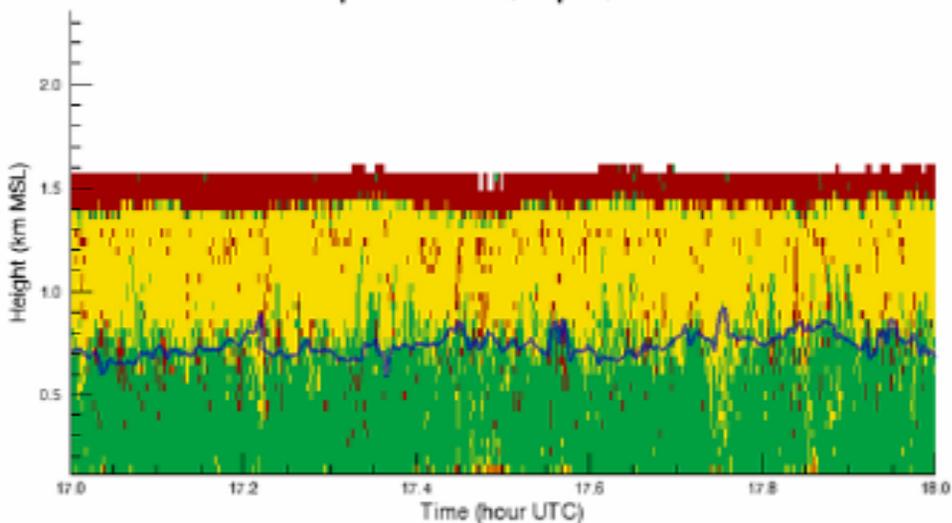


NSA 20041009 Shupe Solid/Liquid/Mixed Classifications

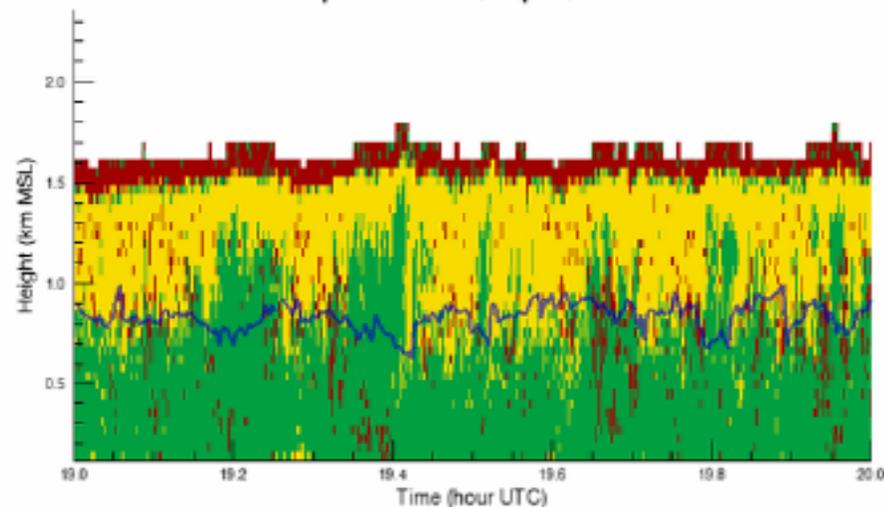


Doppler spectra-based cloud phase retrieval technique (Kollias et al., 2006)

NSA 20041009 Spectra Solid/Liquid/Mixed Classifications



NSA 20041009 Spectra Solid/Liquid/Mixed Classifications



Kollias et al. Microbase product *(under development)*

