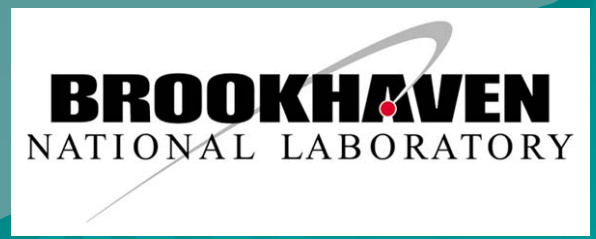
Current Status of the ARM CPWG VAPs

Michael Jensen, Jennifer Comstock, Connor Flynn, Karen Johnson, David Troyan, Ed Luke, Maureen Dunn

ARM Cloud properties working group meeting Fall 2006

Annapolis, MD



ARM Value Added Product (VAP) Summary and Status Report

Last Updated: 22 September 2006

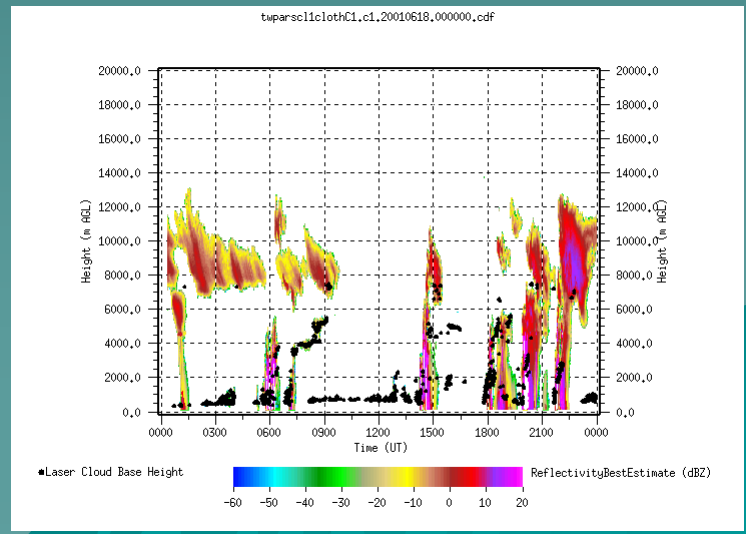
ARM Translator Team
(J. Comstock, C. Flynn, M. Jensen, C. Long, D. Turner, and S. Xie)

Active Remote Sensing of CLouds (ARSCL)

• cloud boundaries, hydrometeor height distributions and estimates of their radar reflectivities, vertical velocities, and Doppler spectral widths

• Micro-ARSCL takes advantage of the new spectral capabilities of MMCR. Come see talk (E. Luke) during Datastream breakout tomorrow

• “Old” ARSCL – Availability via ARM archive
  SGP – 11/1996 thru 1/2006
  NSA – 3/1998 thru 9/2006
  TWP-C1 – 7/1999 thru 12/2004
  TWP–C2 – 11/1998 thru 8/2004
  TWP-C3 – 11/2005 thru 3/2006



Merged Sounding (MS)

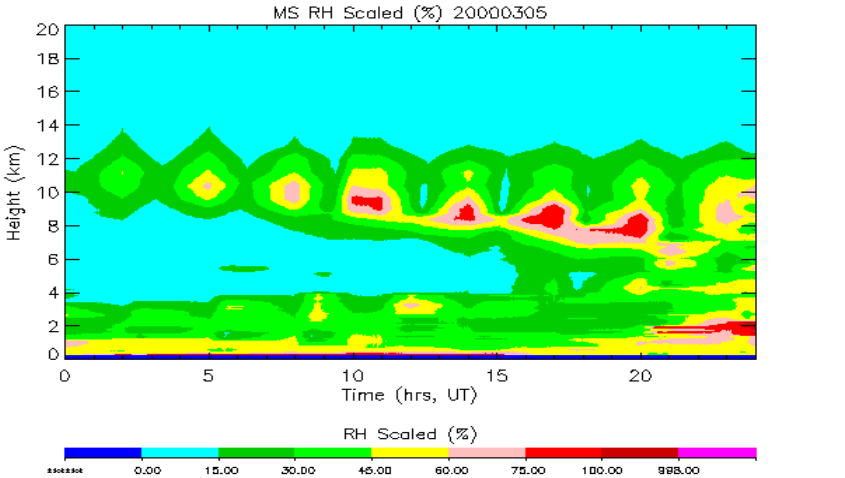
- Uses a combination of radiosonde profiles, MWR integrated water vapor, surface meteorology and ECMWF model output to provide a thermodynamic profile of the atmosphere at one minute intervals
- The current version of MS was used to meet the ARM 1st quarter metric for FY 2006 – "Complete continuous time 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)

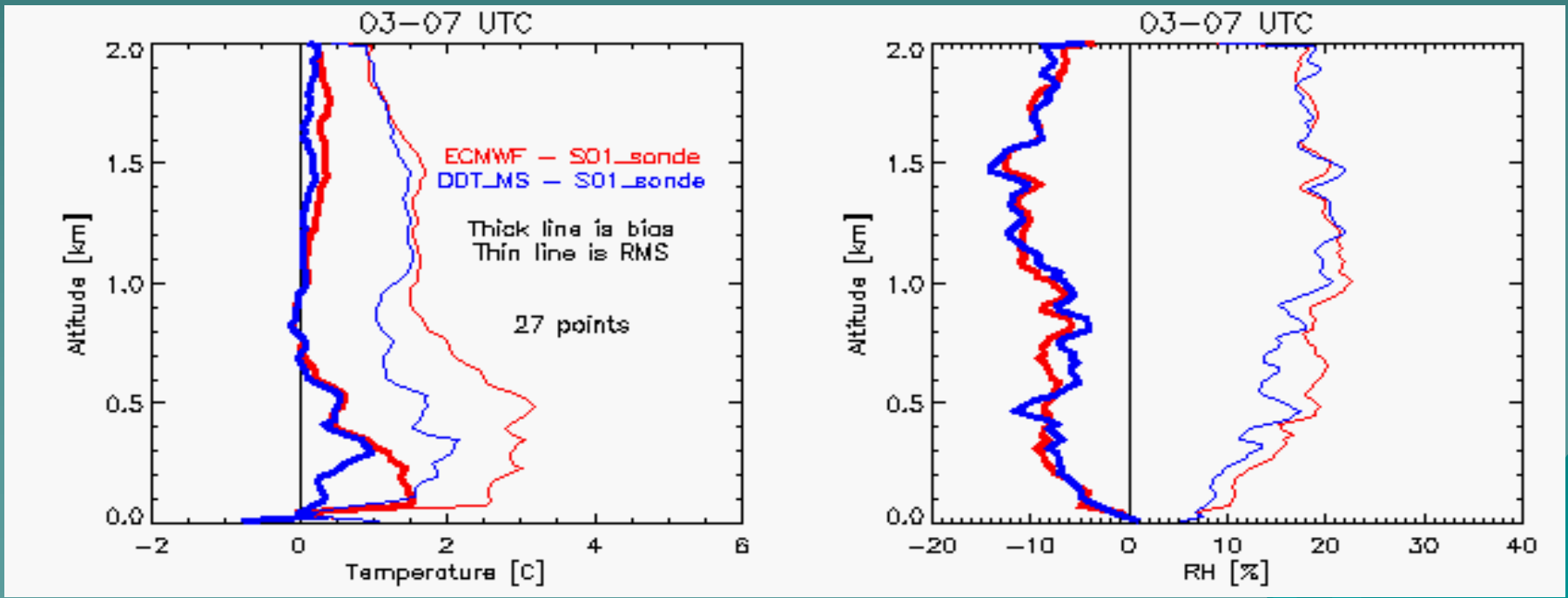
TWP C3 – January 2005 (10/04)

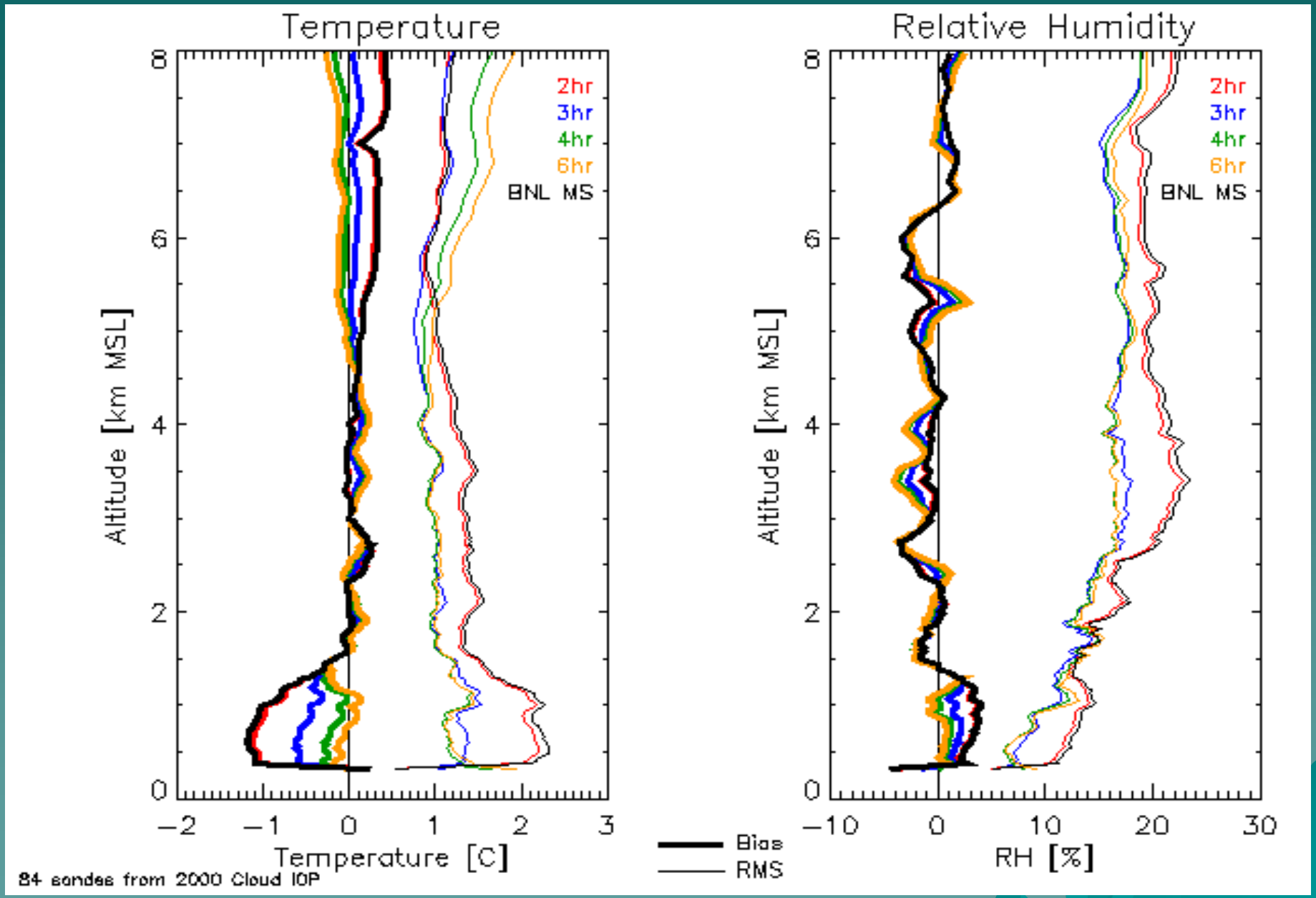
TWP C1 – (2/00-7/00, 10/04)

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




Temperature
Relative Humidity
Altitude [km MSL]
Temperature [C]
RH [%]
2hr
3hr
4hr
6hr
BNL MS
Bias
RMS
84 sondes from 2000 Cloud IOP

Current focus on Merged Sounding

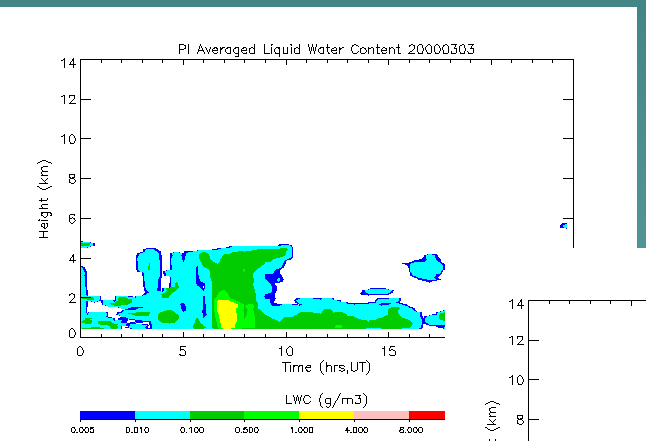
- Complete implementation of DDT algorithm
- Produce multiple years of MS at each site
- Release MS data to archive

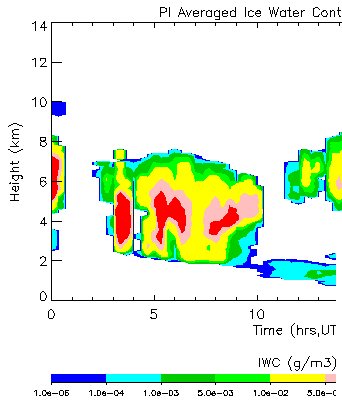
- Include for version 2:
    - Milosevich humidity corrections
    - Increase height of MS
    - ECMWF temperature corrections
    - Profiling MWR data

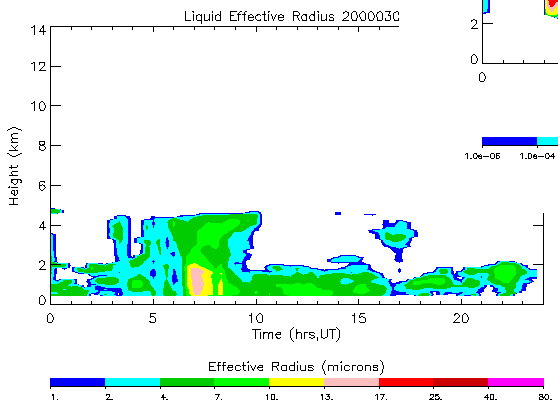
Continuous Baseline Microphysical Retrieval (MICROBASE)

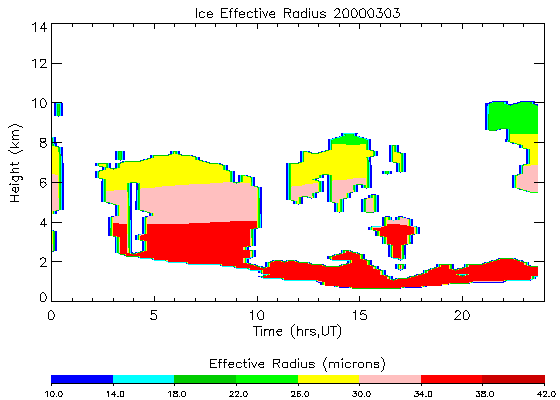
- **Provides time-continuous information on cloud location, liquid and ice water contents, and effective droplet sizes as a function of height [P_i =instantaneous, P_a = averaged]**

- **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 3rd 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”

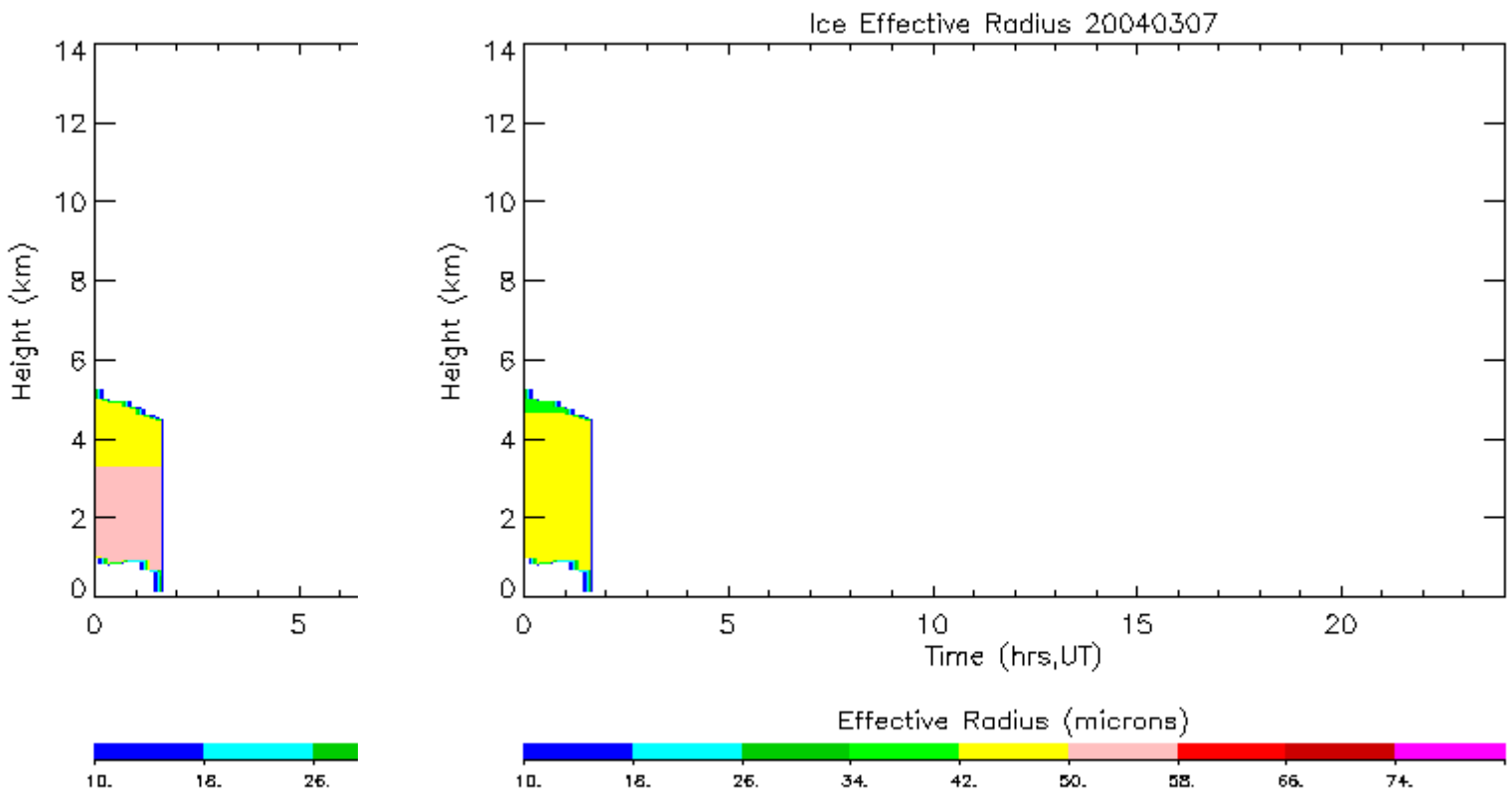
Availability – “PI products”

SGP – March 2000 – February 2001

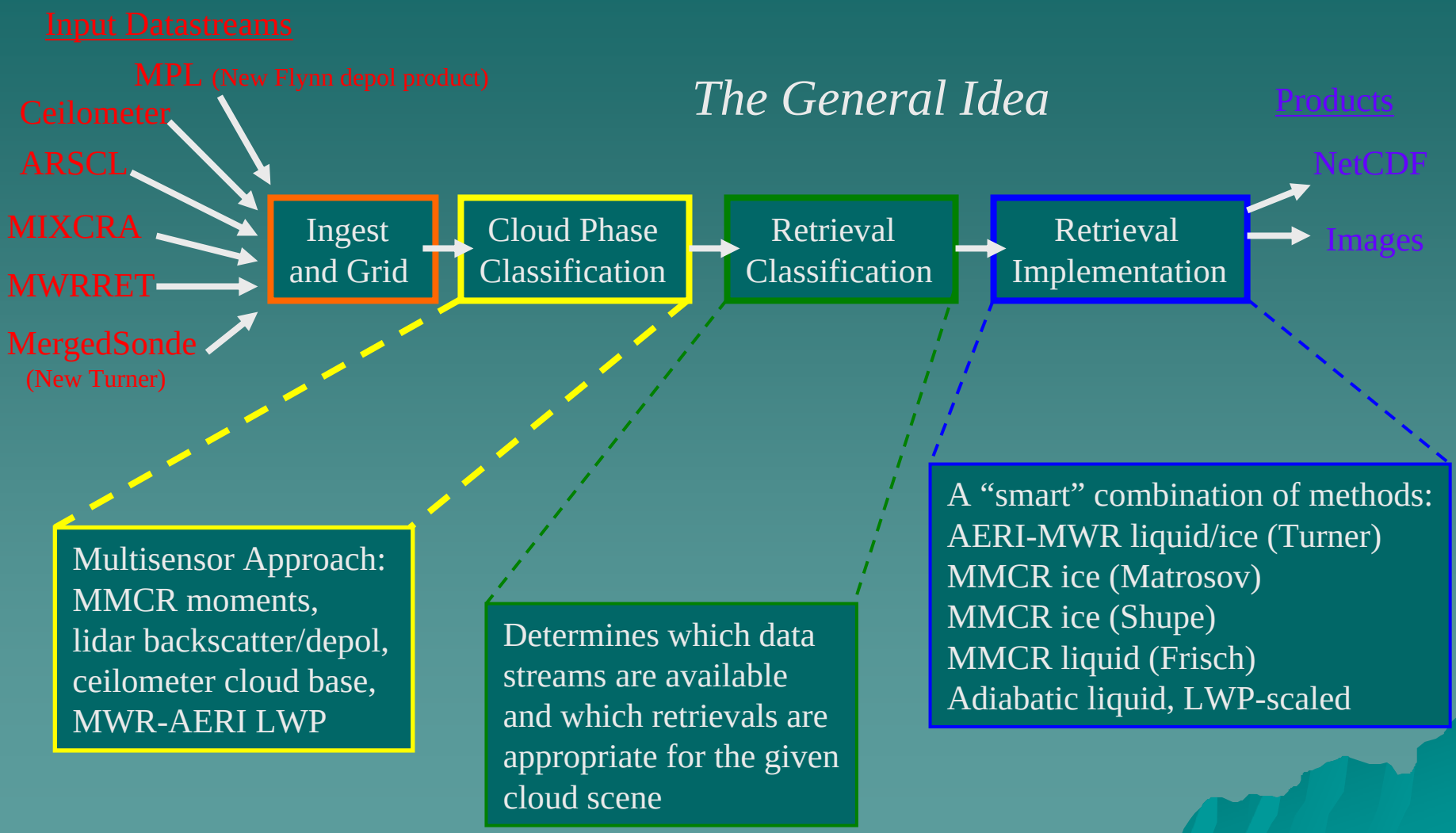
NSA – January 2004 – December 2004

TWP C1 – November 2003 – October 2004

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

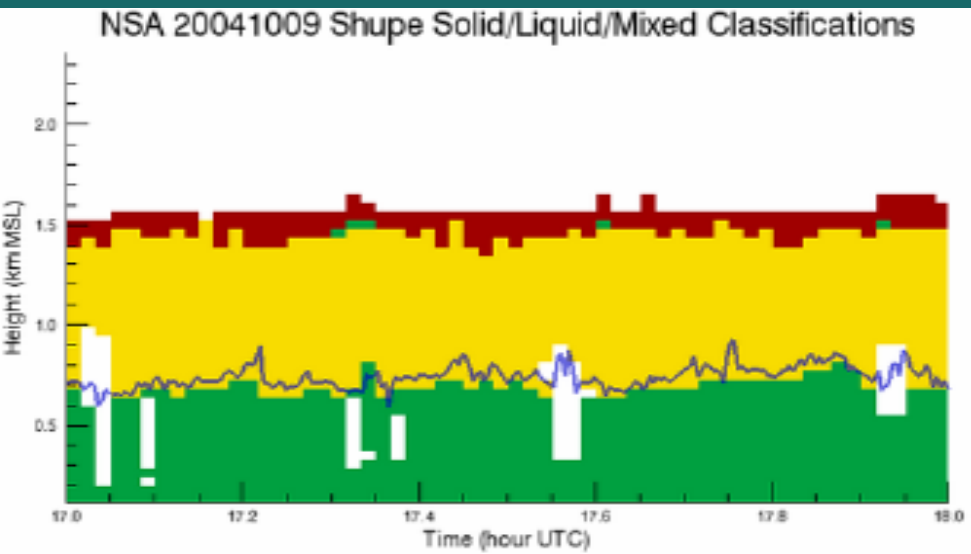


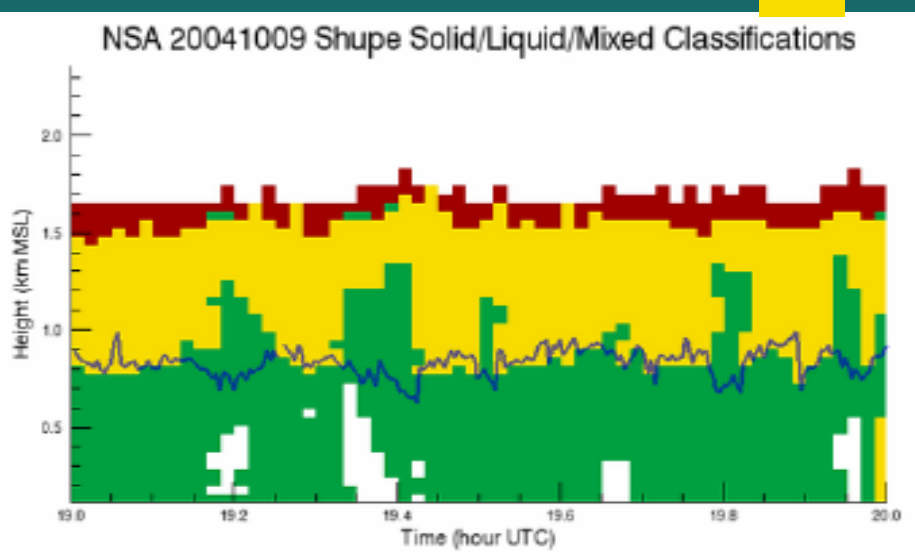
Shupe-Turner Microbase Product (*under development*)



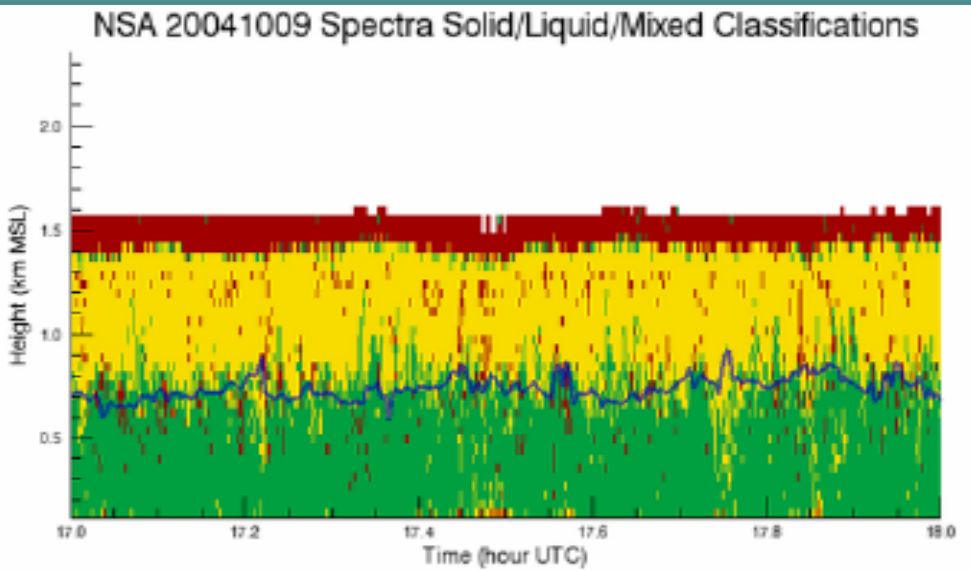
High Spectral Resolution Lidar + MMCR moments + MWR (provided by Shupe and Eloranda)

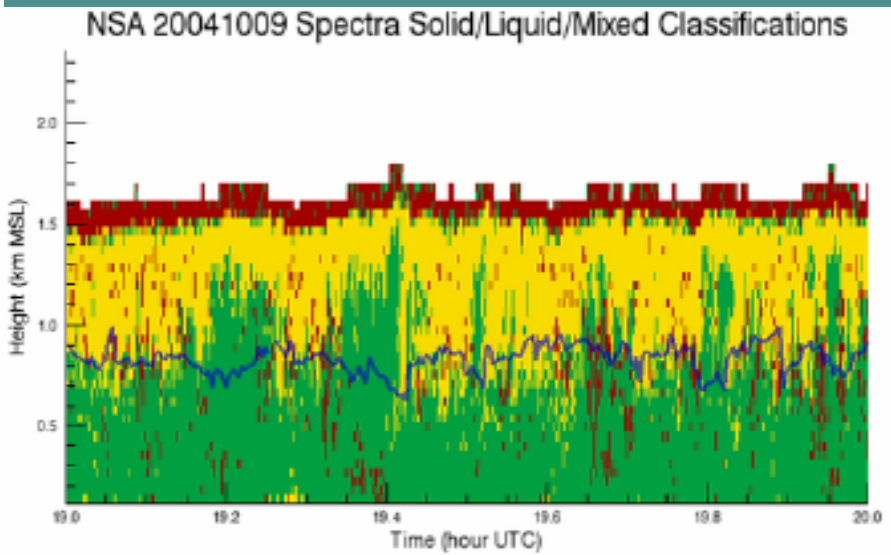
Liquid
Ice
Mixed



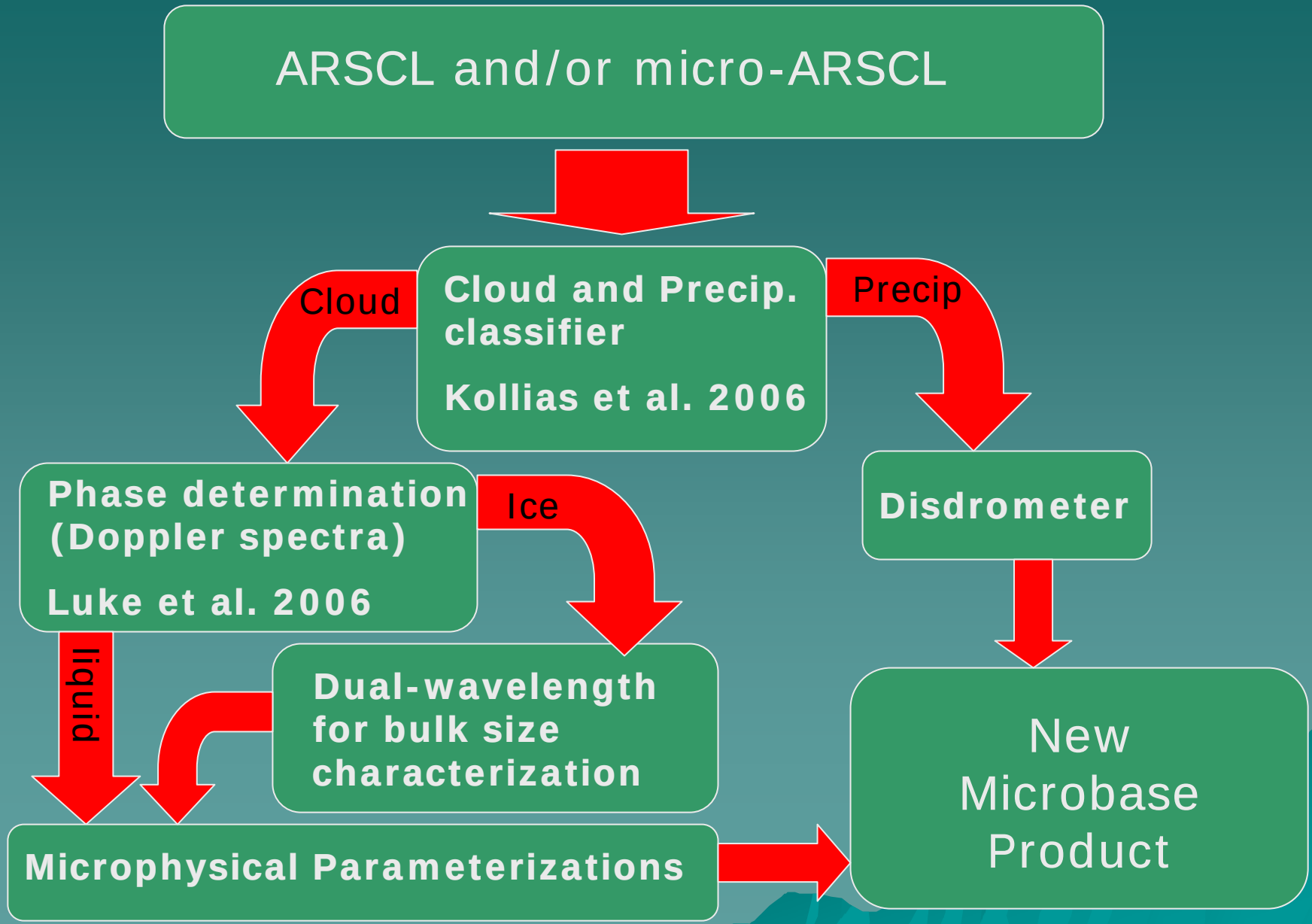


Doppler spectra-based cloud phase retrieval technique (Kollias et al., 2006)





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



Coming down the pipe

Cloud Classification VAP

WG/Science Sponsor: CPWG / Zhien Wang

Translator: Jennifer Comstock

Radar spectral analysis VAPS (Kollias/Luke)

PI data products

BBHRP, micrbase, merged sounding

RH-corrected-soundings (L. Milosevich)

TWP-clouds (J. Mather, S. McFarlane)