



Chief Scientist Report ARM Science Team Meeting 2007

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ARM Chief Scientist Team



Mark Miller



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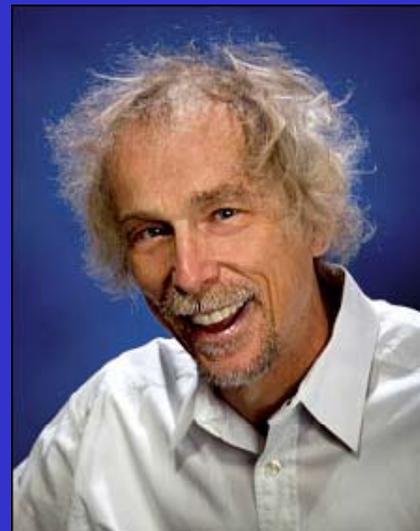
Ric Cederwall



Yangang Liu



Sharon Zuhoski





Your Chief Scientist taking sonde-launch training in TWP-ICE



What do I do now?





Send me your...

science highlights

poster PDFs (esp if you win CS Design Award)

ideas!



News

- this is a proposal year
- Gordon Conference, Rad & Climate, July 27
- ICRCCM-1 website
- Apr 10 extension for AMF09 pre-proposals
- talk to
 - our ARM AMS Fellow, Maryann Racine
 - our FAA visitor, Gloria Kulesa
 - our CASA visitors Dave McLoughlin & Heather Flynn



ARM highlights since Mar 2006

Mobile Facility deployments

- Niger
- Germany

CLASIC : ASP and NASA participation

ARM papers in Feb 2007 BAMS :

- CLOWD (Turner et al)
- Ice clouds (Comstock et al)
- MPACE (Verlinde et al)



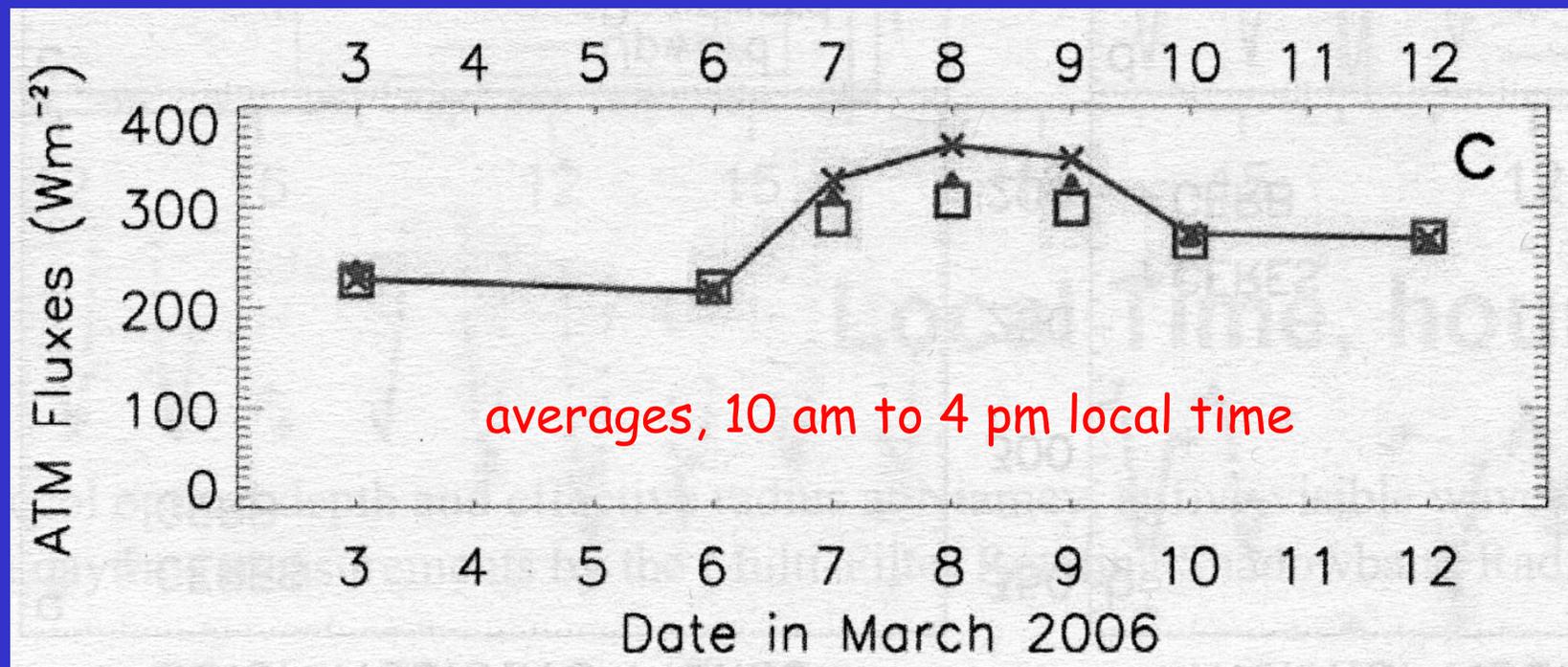
AMF deployed in Germany, Mar 2007





Niger: ARM Mobile Facility + GERB got first long-term radiative heating dataset!

Dust storm case: TOA to surface shortwave rad'n flux differences vs. time
(x: measured; symbols: modeled)





ARM highlights - 2

Outreach to climate modeling groups

- visits

- radar simulator based on EarthCare Simulator (Donovan)

- statistical summaries

- ARM Fellows

ARM parameterizations moving into climate models

- CCN

- RRTM (radiation)

- McICA (radiation)

- convective triggering

Statistical Summaries for climate modelers

ARM Cloud Parametrization & Modeling WG - home - SeaMonkey

File Edit View Go Bookmarks Tools Window Help

Back Forward Reload Stop http://science.arm.gov/wg/cpm/scm/statistical_summaries.html

Home Bookmarks Red Hat, Inc. Red Hat Network Support Shop Products Training

Statistical Summaries of ARM data for Climate Modelers

The ARM program collects unique data related to radiation, clouds, water vapor, and aerosols of great value to climate modelers. This web page provides a few sample analyses of multi-year data from the Southern Great Plains site with comparisons to climate model simulations for the same location.

[Seasonal Cycle at the Southern Great Plains](#)

Cloud Fraction from the Cloud Radar

ARSCL, CAM and GFDL Cloud Fraction

Explore the data yourself

Would you like to explore the data yourselves?

[Browse the Dataset](#)

[Quick look plots](#)

[Seasonal and diurnal cycle](#)

The dataset extends the following years: 1999 - 2001.

There is more data available including data for the satellite observations, surface sensible and latent heat fluxes, and surface meteorology.

Would you like to download the data for your own exploration?

The data used in the statistical summaries is from a 3 year analysis (1999-2001) which is



ARM highlights - 3

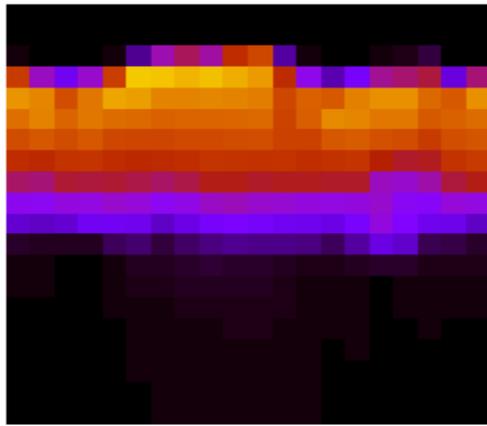
- Sunset Committee
 - Nauru
 - VAPs
- RHUBC, Barrow (Feb 07)
- cloud tomography



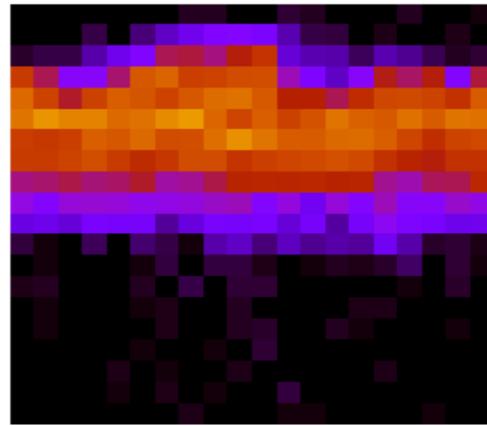
Cloud liquid water tomography with 8 scanning microwave radiometers (Dong Huang)

gm^{-3}

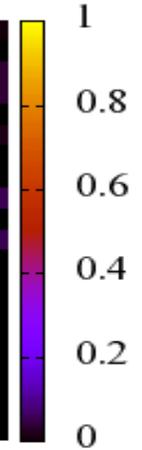
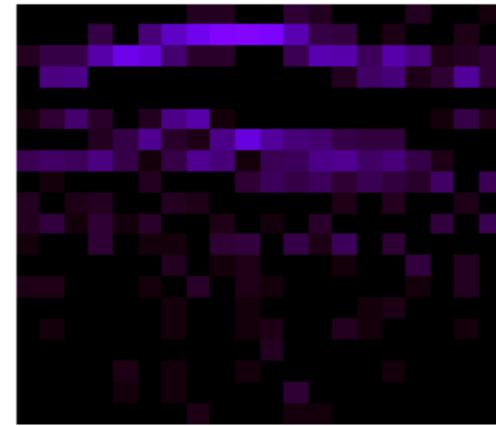
Original



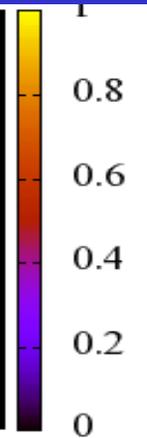
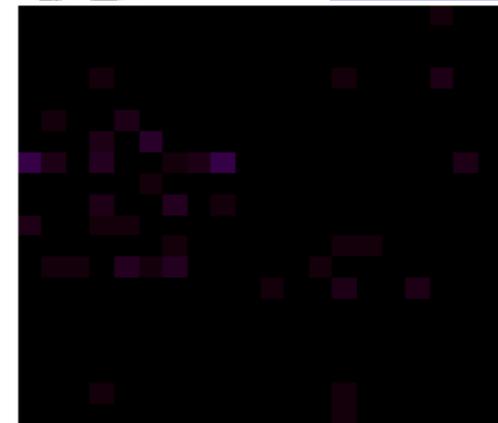
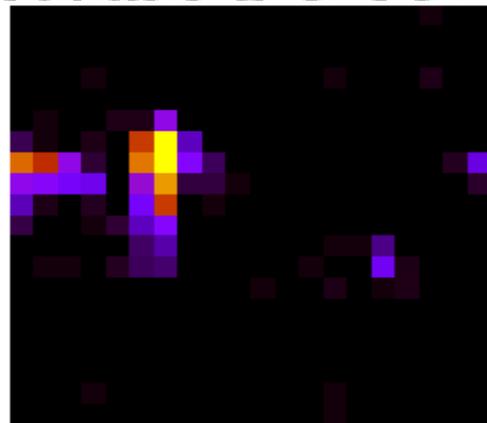
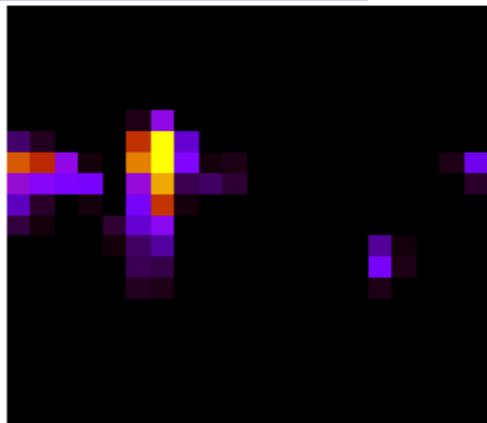
Reconstructed



Error



20x20 resolution



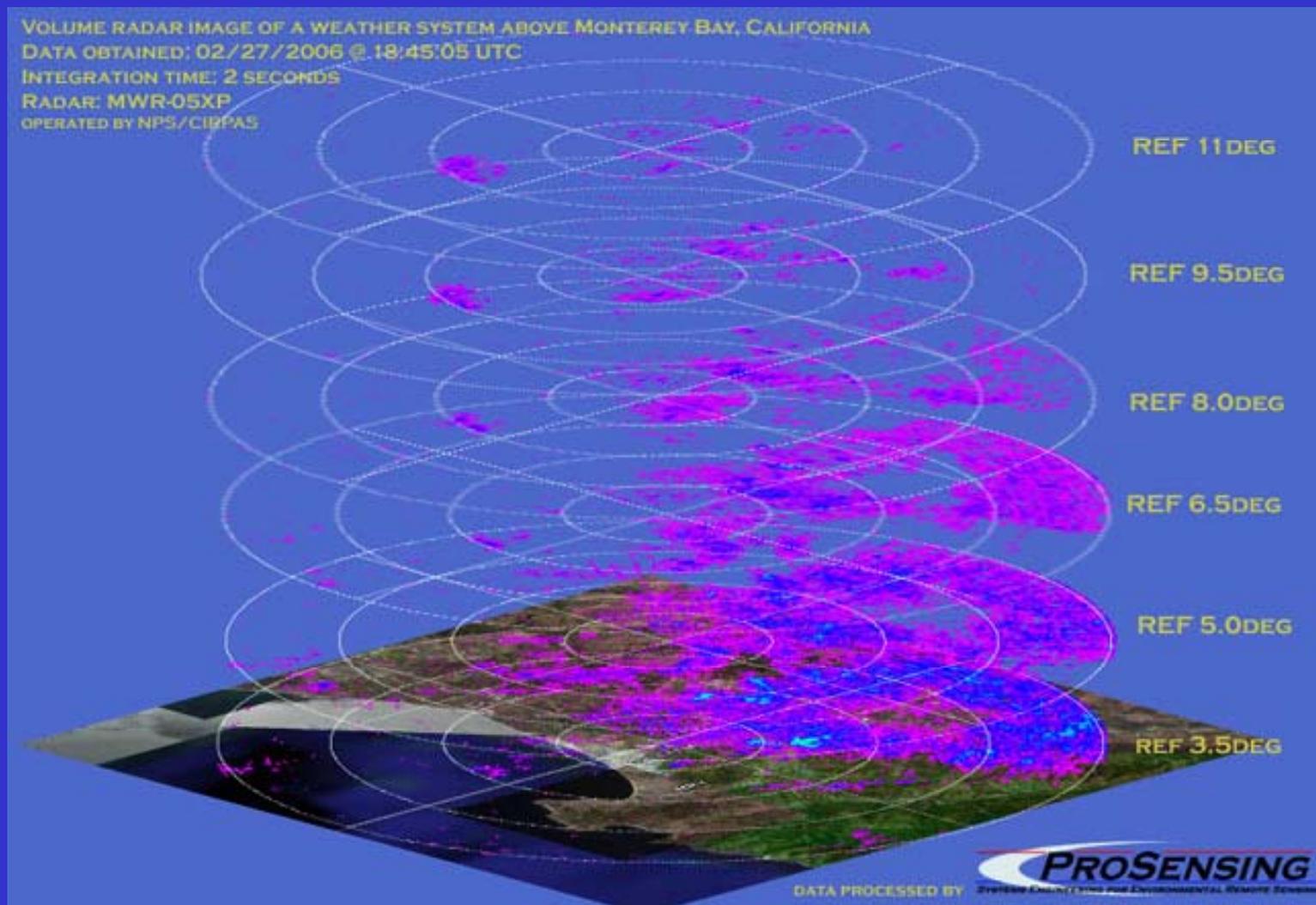


ARM highlights - Radar

- Joint projects with GPM Ground Validation
 - build a two-frequency scanning radar
 - hold a Simulator workshop
 - field campaign in 2010
- Radar Focus Group forms
- Joining CASA
- New 94-GHz radars deployed and working
- AVA plan: volume-scanning radar(s)
 - validation of 3D radiative transfer

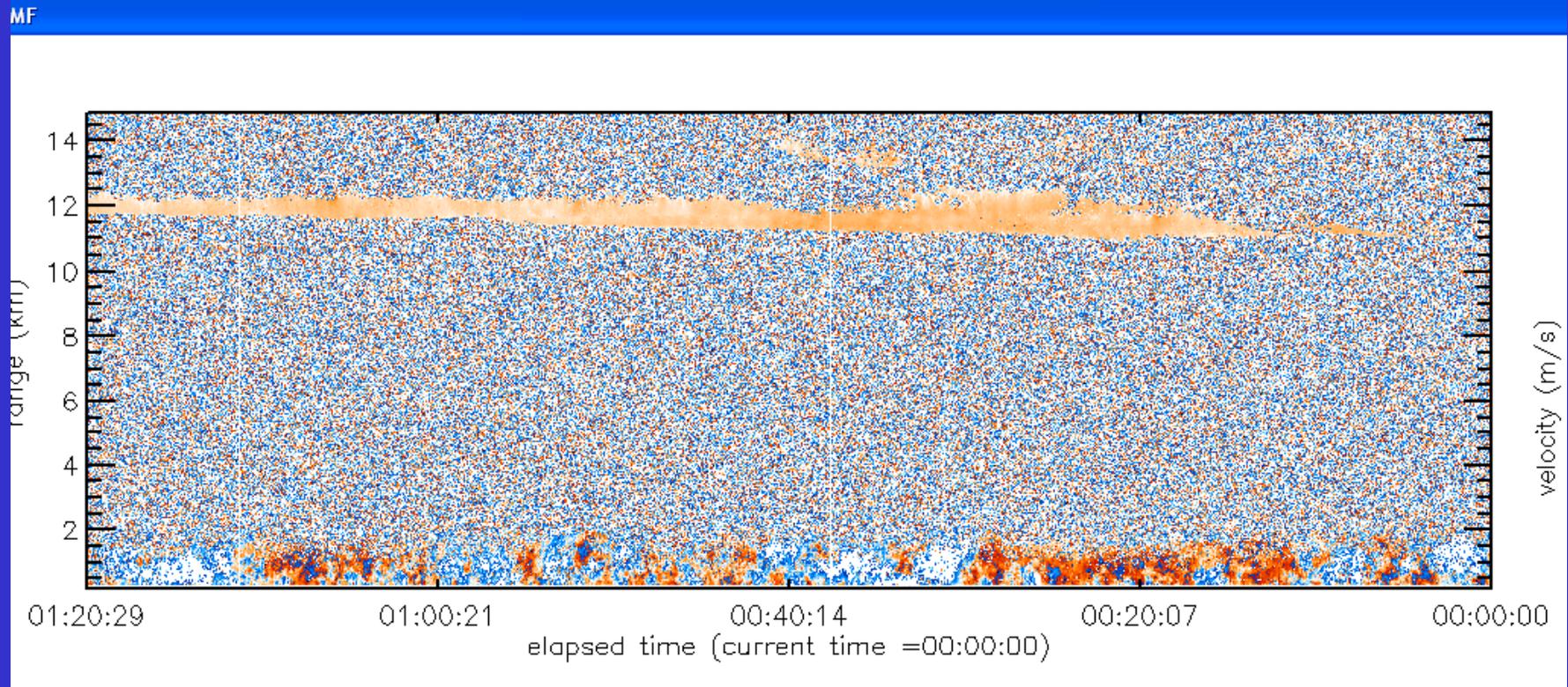


An example of what can be done with a fast volume-scanning radar





"First light" image from new 94 GHz AMF radar in Niger





ARM highlights - 4

- 1st Radiative Heating Profile Workshop, Jan 2007
 - outreach to Latent Heat Profile community
- AVP routine flights starting in 2008



Not Yet Done: 2nd Mobile Facility as marine facility (on hold)

workshop June 2006

plan approved by STEC





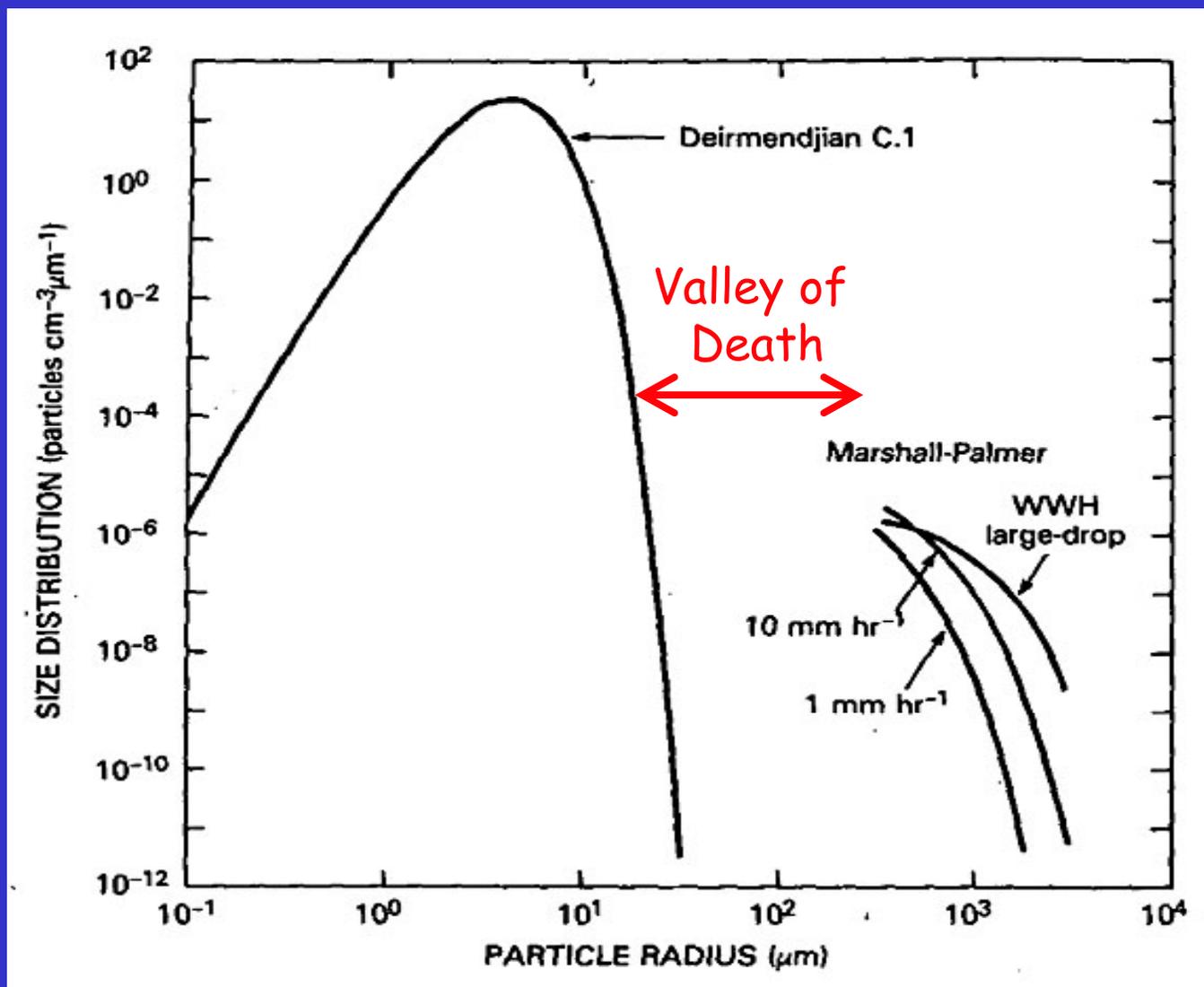
Not Done Yet: Radiative Heating in Underexplored Bands campaign to Chile

A 5.5 km altitude site: Chajnantor, Chile





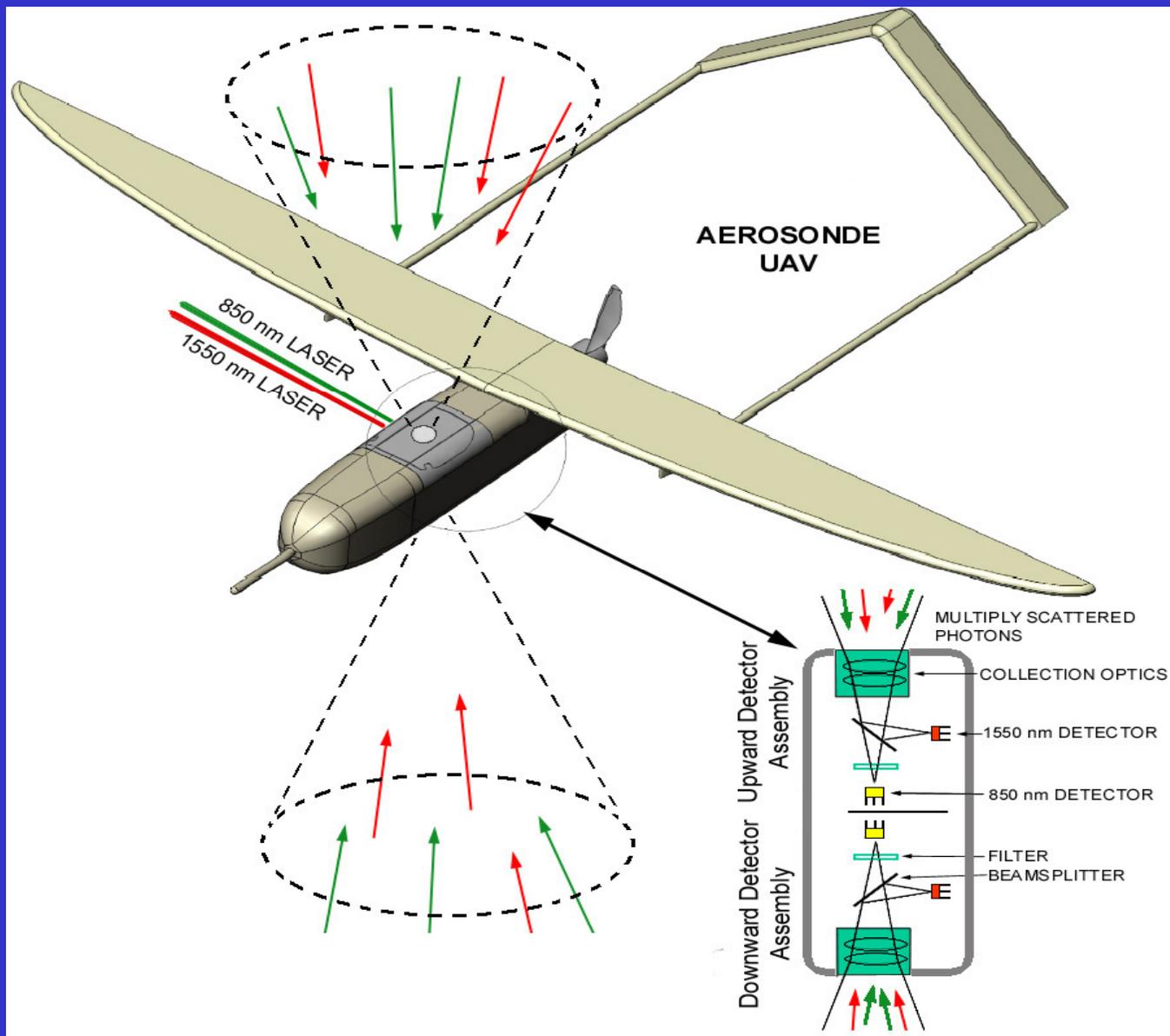
Not Yet Done: looking at ALL the drops up to precip sizes





Not Yet Done: validating liquid water and cloud optical depth

- Variables central to ARM yet poorly validated
- CLOUD routine flights, 2008
- New instrument concepts:
 - Raman lidar liquid/ice channels
 - multiple scattering lidar (including in situ)
 - cloud tomography
- Stacked small UAVs to measure LWC and extinction profiles



In situ
lidar for
cloud
extinction
can be
fit into
small
UAVs



Not Done Yet: making ARM data less soda-straw and more 3D

Cloud models have moved to 3D while our meas'ts are stuck in 1D and 2D

Solutions:

- (1) Scanning (fast!)
 - Europeans: co-scan cloud radar and passive microwave
 - Americans: dual-frequency cloud and precip radar
- (2) Multiple scattering lidars
- (3) Routine aircraft flights (small UAV squadrons or conventional)
- (4) Cloud tomography



Grades for progress past the soda straw

- AVP routine flights, conventional (A-)
- Tomography (B+)
- Volume scanning radar (B-)
 - AVA postponed
 - but ... started *CASA* and *GPM* radar collaborations
 - and started Radar Focus Group
- Small UAVs (C-)
- Multiple scattering lidars (D+)



Two years later and I'm still having fun!

