Chief Scientist Report
ARM Science Team Meeting 2007

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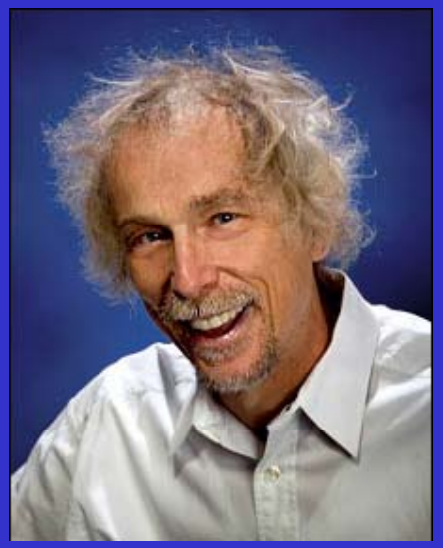


Your Chief Scientist taking sonde-launch training in TWP-ICE

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)

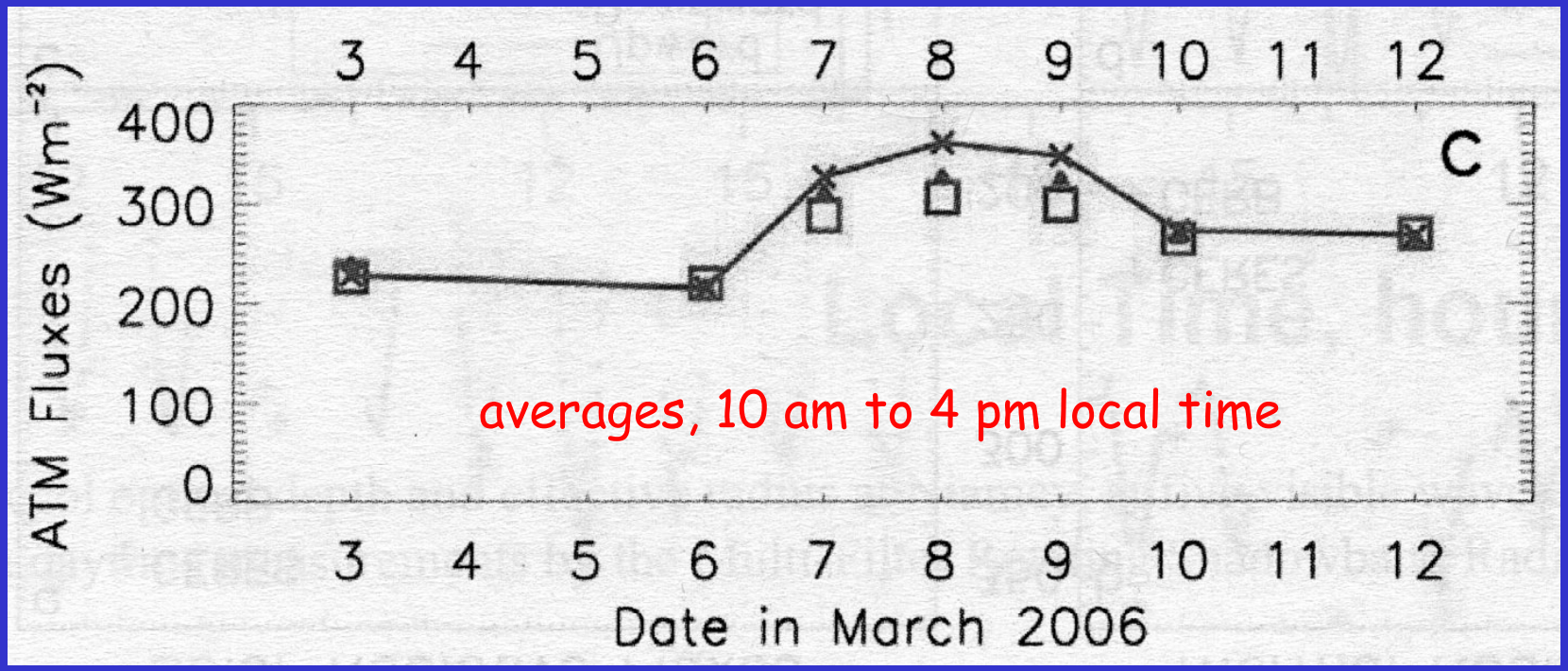
Ice clouds (Comstock et al)

MPACE (Verlinde et al)

AMF deployed in Germany, Mar 2007

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

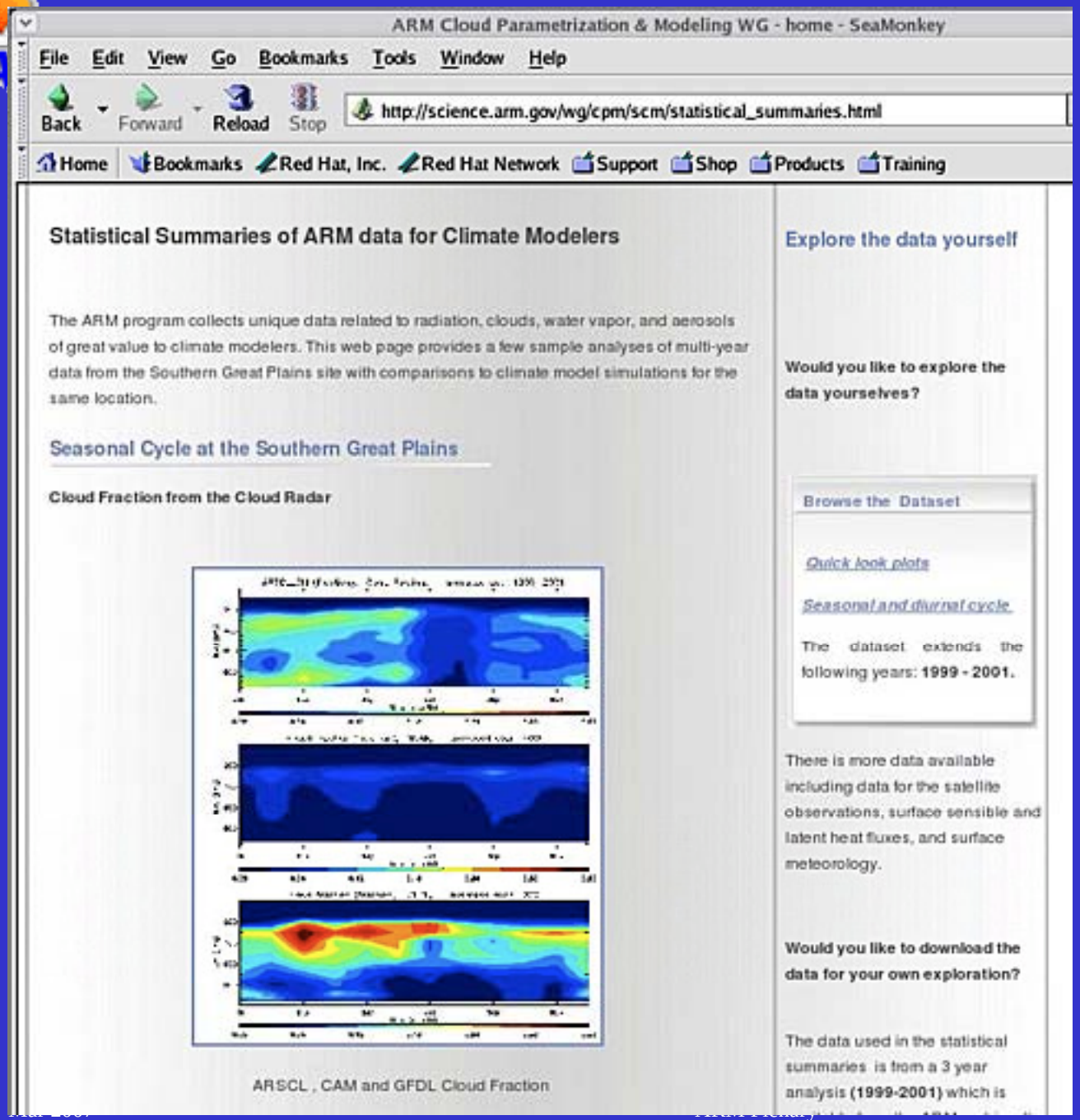
Dust storm case: TOA to surface shortwave rad'n flux differences vs. time
(x: measured; symbols: modeled)



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

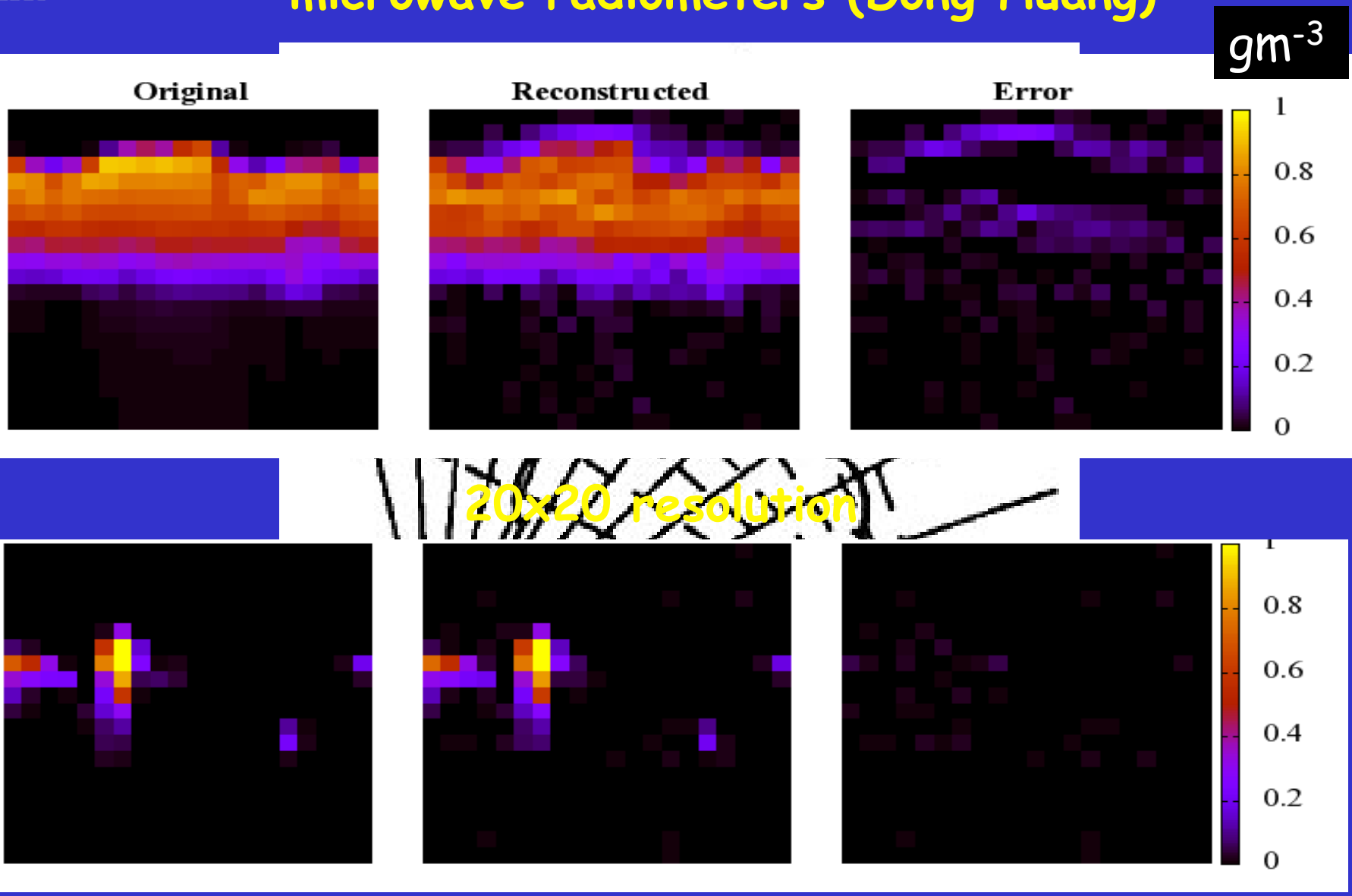
Statistical Summaries for climate modelers



ARM highlights – 3

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

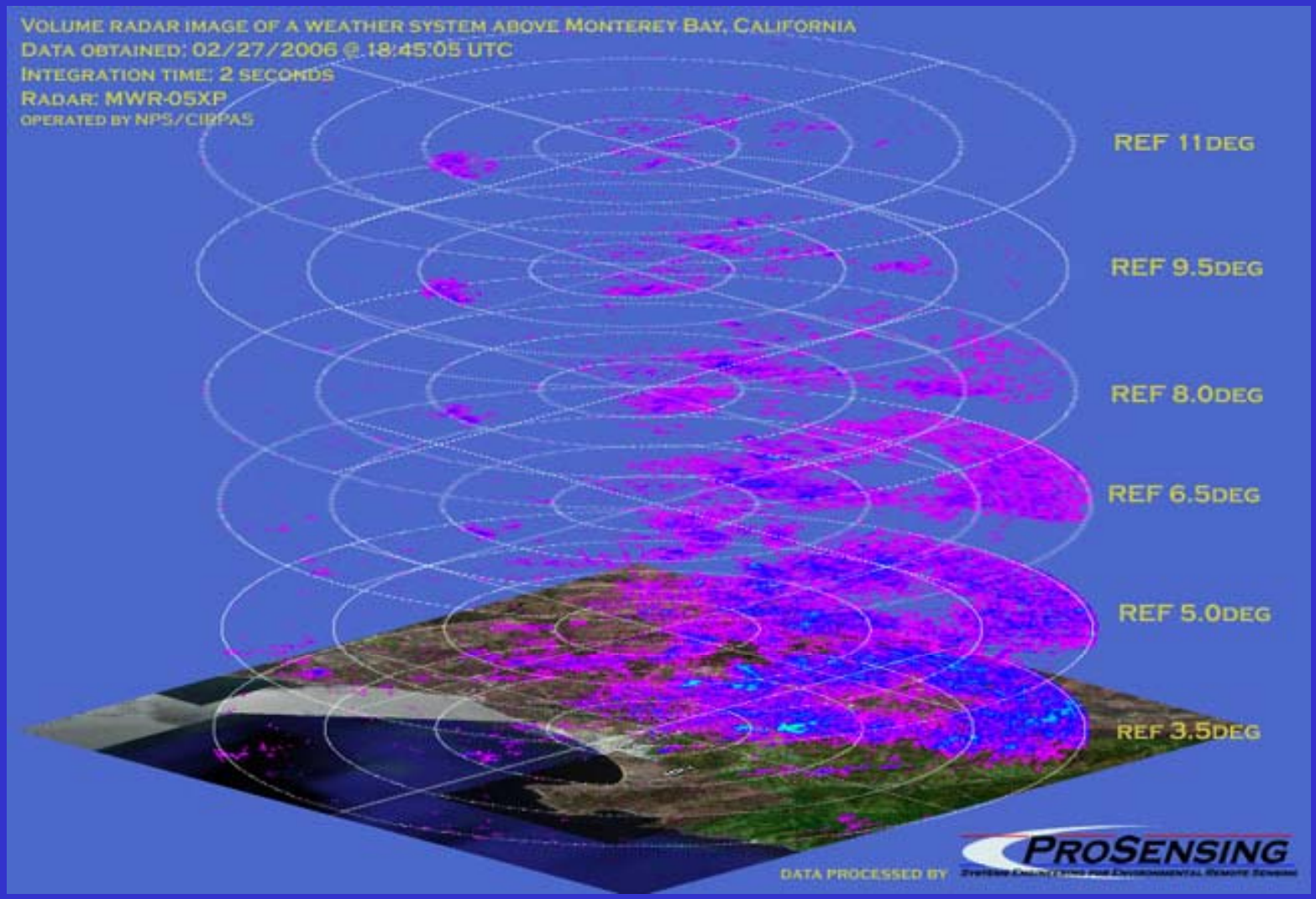
Cloud liquid water tomography with 8 scanning microwave radiometers (Dong Huang)



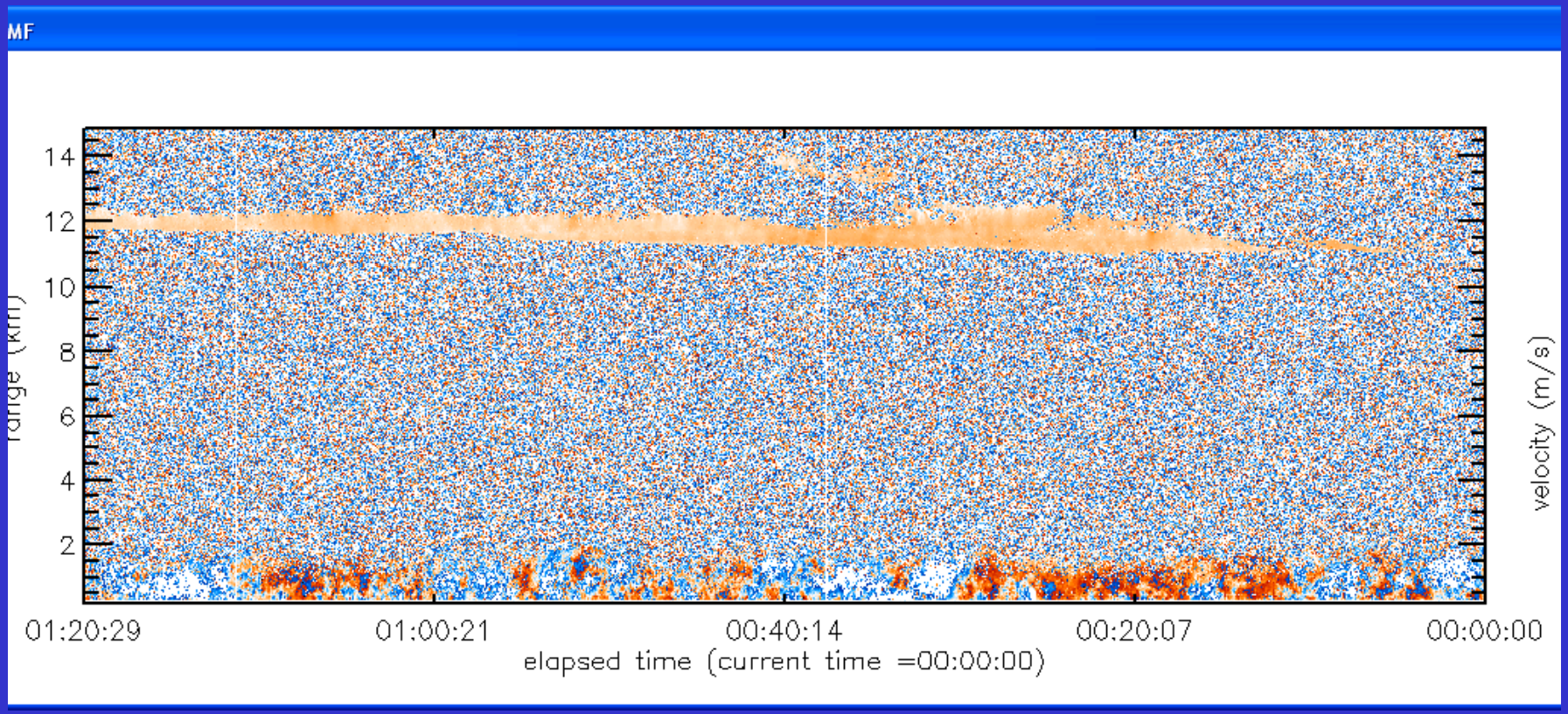
ARM highlights – Radar

- 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

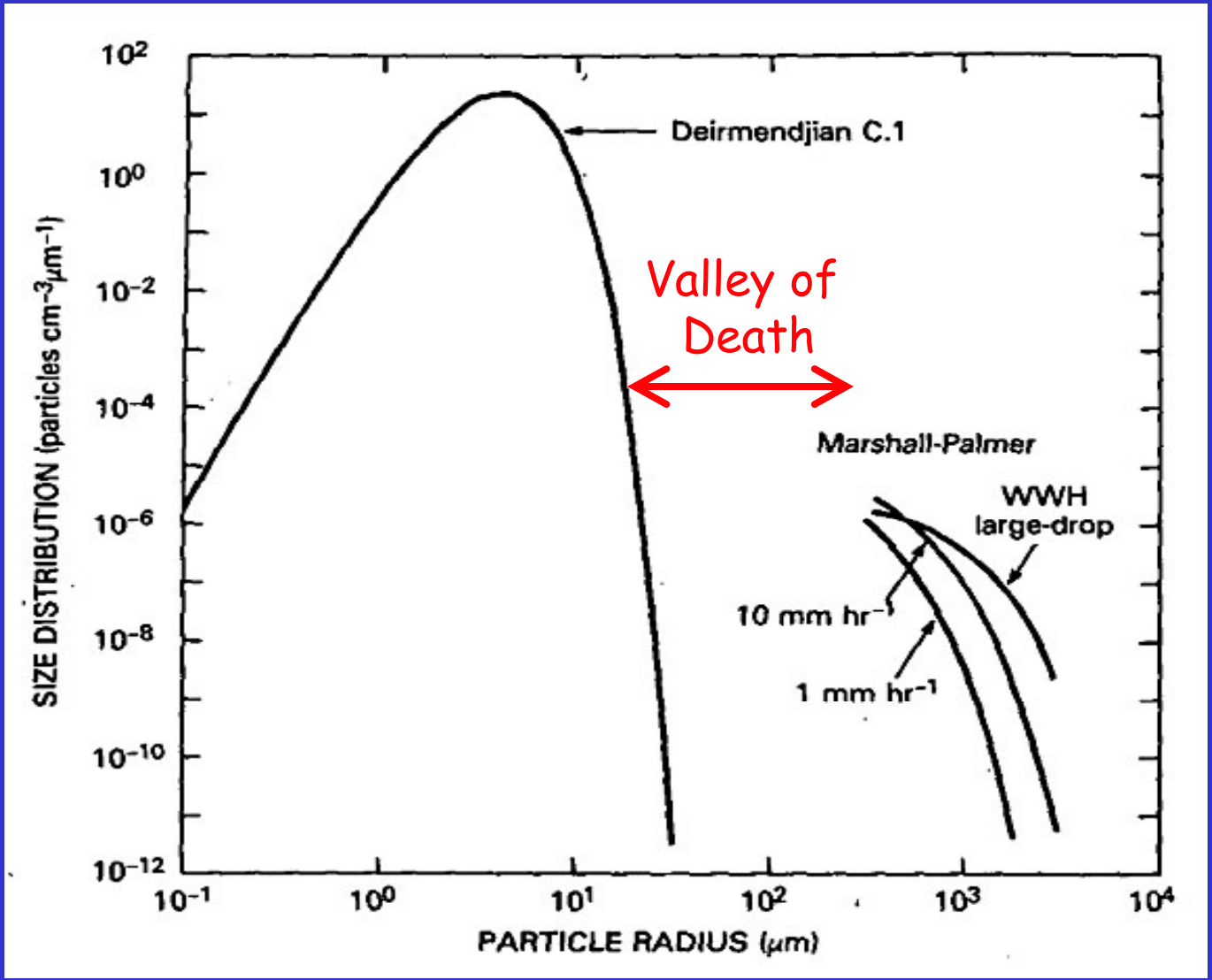
Not Yet Done: 2nd Mobile Facility as marine facility (on hold)

workshop June 2006

plan approved by STEC

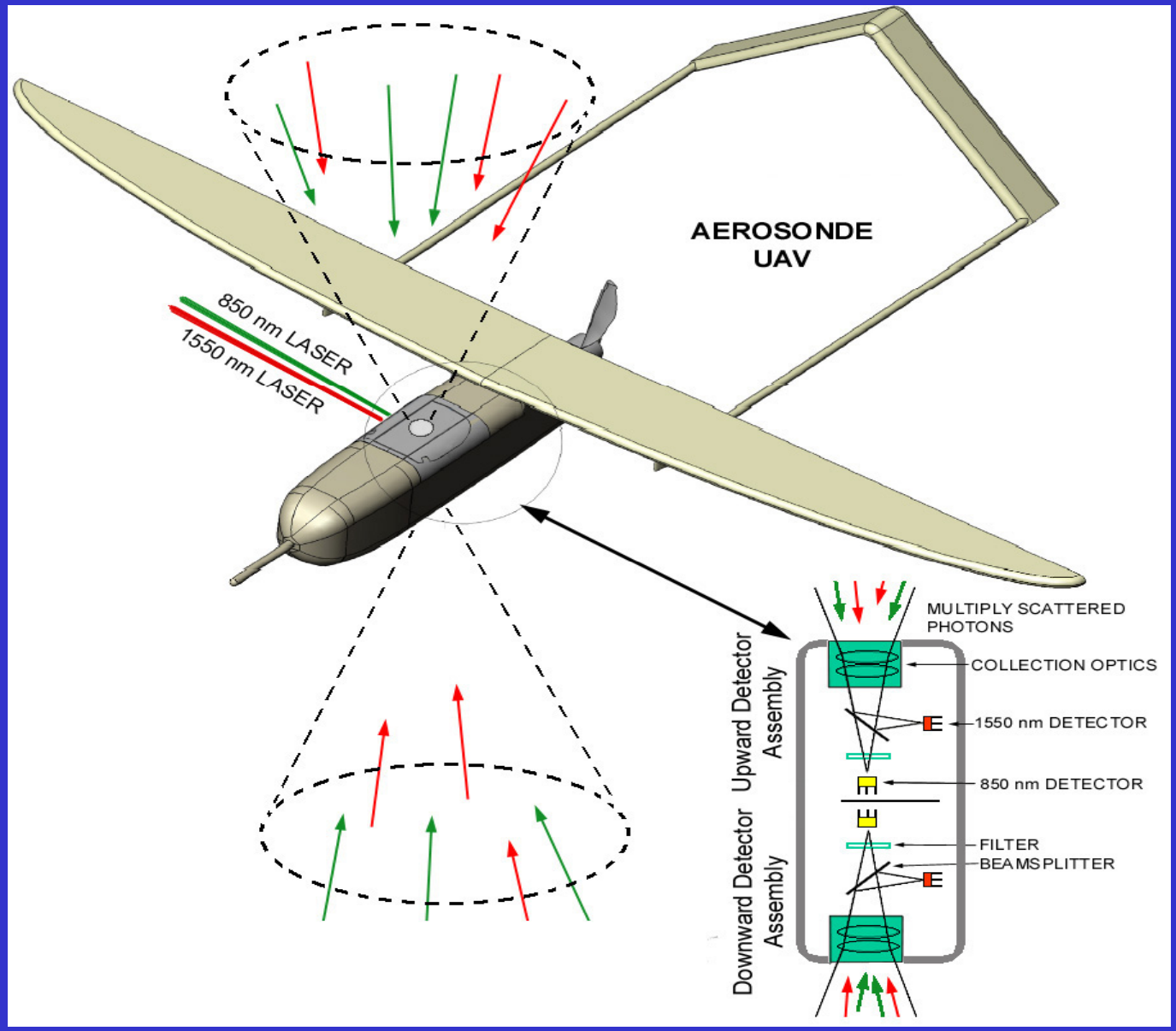
Not Done Yet: Radiative Heating in Underexplored Bands campaign to Chile

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
- CLOWD 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!