

**Liquid Phase Subgroup  
Breakout Summary from  
Fall 2006 CPWG  
(With Updates)**

**Dave Turner and Andy Vogelmann**

*Cloud Property Working Group Breakout Session  
26 March 2007  
Arm Science Team Meeting  
Monterey, California*

# Sub-group Agenda: 9 Nov 2006

## Presentations (7)

- Wang - Refine Arctic Microwave Radiometer LWP Retrieval by Using Multiple-sensor Measurements and Retrievals
- Turner - Combined AERI and MWR Retrievals
- Chiu - How Can One Interpret ARM 2NFOV and SWS Obs?
- Marshak - Lidar solar background for optically thick clouds
- Zinner - New means of airborne water cloud remote sensing
- Cadeddu - MWR IOP at SGP
- Vogelmann - MWR Validation Experiment IOP during COPS

## Discussion Items (3)

### Min/Vogelmann

- Proposed Instrument Modification: TC-RSR  
(Thin Cloud Rotating Shadowband Radiometer)

### Vogelmann/Turner

- Group Discussion: Addressing Scale Babble

### Zhu

- Group Discussion: ARM LES Testbed

# Presentation Summaries (1)

## Dave Turner - Improved MWR Retrievals (MWRRET)

- Algorithm almost finished being implemented as VAP
- *Multiple years processed at all ACRF sites*
- *Paper submitted to IEEE TGARS*

## Zhien Wang - Refined Arctic MWR LWP retrieval

- Improved 2-chan MWR retrieval using (a) clear sky calibration, and (b) different water dielectric constants
- *Paper accepted in IEEE GSRL*
- How compare w/ MWRRet?

## Dave Turner - Combined AERI and MWR Retrievals

- Combines complementary sens. of AERI & MWR
- *Paper on Pt Reyes, including rad flux closure, submitted*
- Suggests AERI+MWR+MFRSR for overcast
- MWR 'undulation' indicated in data

## Presentation Summaries (2)

### Maria Cadeddu - MWR IOP at SGP

- Intercomparison of 6 MWRs
- LN<sub>2</sub> calibs →  $\Delta$ BTs 1.6 K (31.4 GHz), and 3.1 K (23.8 GHz)?
- Diffs (smaller) also in obs. sky BTs
- *Sent 2 MWRs from Manus and Nauru to vendor (were very bad) & have been repaired. Currently at SGP for checkout.*
- *Currently sending another 2 back for refurbishment and factory calibration.*

### Maria Cadeddu - New 90 / 150 GHz radiometer

- *Instrument suffered hardware failure (150 GHz channel) and is being sent back to vendor.*
- *Second system should be delivered in 1-2 months*

### Vogelmann Turner et al. - MWR Validation Exp. at COPS

- Sent proposal (CP & RP endorsed).
- *Accepted ! New 90 / 150 GHz system to be deployed with AMF in Germany in April, as well as the 2NFOV.*

## Presentation Summaries (3)

### Christine Chiu – Interpetting 2NFOV and SWS Measurements

- 2-NFOV retrievals of  $\tau$ , and effective cloud fraction
- Extending work to new SWS at SGP (w/ 1.6  $\mu\text{m}$  chan)
- More inter-comps in radiance needed, esp. for 1.6  $\mu\text{m}$
- *2-NFOV deployed to Germany as part of CLOWD-IOP*
- *SWS returned to vendor for updates*

### Sasha Marshak - Lidar solar backgnd for opt. thick clouds

- Cld & aerosol prop. can be retriev'd using a single lidar.
- Showed very good agreement w/ 2-NFOV
- Limited by broken clds, and  $\tau$  between 4 & 12
- Requests help with calibration and aerosol  $\tau$
- *Paper is accepted for publication (IEEE GRSL)*

### Toby Zinner- New means of airborne water cld rem. sens.

- CASI (Compact Airborne Spectrographic Imager)
- Scanned radiance at 753 nm, horiz. res 15m, for 150  $\text{km}^2$
- Use iteratively to infer 3D statocu fields w/ MC code
- 'Glory' remote sensing of  $\tau$ ,  $R_{\text{eff}}$ ,  $\sigma$

# Discussion Items

## Min/Vogelmann: Proposed Inst. Modification: TC-RSR

Modify FRSR to retrieve LWP ( $2 \text{ gm}^{-2}$ ), Reff (10%),  $\tau$  (2%)

One of VERY FEW instrumt's get LWP AND Reff/tau

Estimates: \$37K (prototype) OR \$58K (full, 1<sup>st</sup>-off, inst)

- Anthony questioned whether 3D effects acc't for
- Jim said could be difficult to get funding → sum' IOPs

## Vogelmann/Turner - Addressing Scale Babble

Time and spatial (FOV) sampling differences between instruments or their uses (e.g., in 'climate' models)

- Important. Rename it – 'babble' misses importance.
- Use model simulations to eval. sampling vs averaging
- At the very, least document what did (like uncert.)

## Zhu/Albrecht - ARM LES Testbed (WRF-LES)

Multiple, 2-way nested WRF grids

- Very enthusiastically received

# Items for Recommendation

## Calibrations

### **2-NFOV retrievals of tau and eff. cloud fraction**

- Add 1.6  $\mu\text{m}$  zenith radiance channel instrument  
(Need for retrievals and intercomparison w/ SWS)

### **Lidar solar background retrievals of optical depth**

- Calibrate the solar background (signal) noise;
- Retrieve aerosol optical depth below thick clouds

### **Proposed TC-RSR for MFRSR retrievals of LWP ( $R_{\text{eff}}$ , $\tau$ )**

- One of very few inst. to get simult. LWP,  $R_{\text{eff}}$
- Generally well received (A. Davis quest 3D effects)
- Time before summer IOPs running out

### **Scale Babble (handling time sync, ave., & FOV mismatch)**

- At the very least, clearly document what did
- Revisit at STM?