

Pending Proposed Field Campaign
**Cloud Microwave Validation Experiment in
Support of CLOWD**

Steering Committee

Andrew M. Vogelmann, Co-Chair

Brookhaven National Laboratory

David D. Turner, Co-Chair

University of Wisconsin-Madison

Maria P. Cadeddu

Argonne National Laboratory

Jui-Yuan Christine Chiu

JCET, University of Maryland Baltimore County

James C. Liljegren

Argonne National Laboratory

Alexander Marshak

NASA Goddard Space Flight Center

Summary

Proposed Begin and End Dates of Campaign

1 March 2007 to 31 December 2007

Proposed location

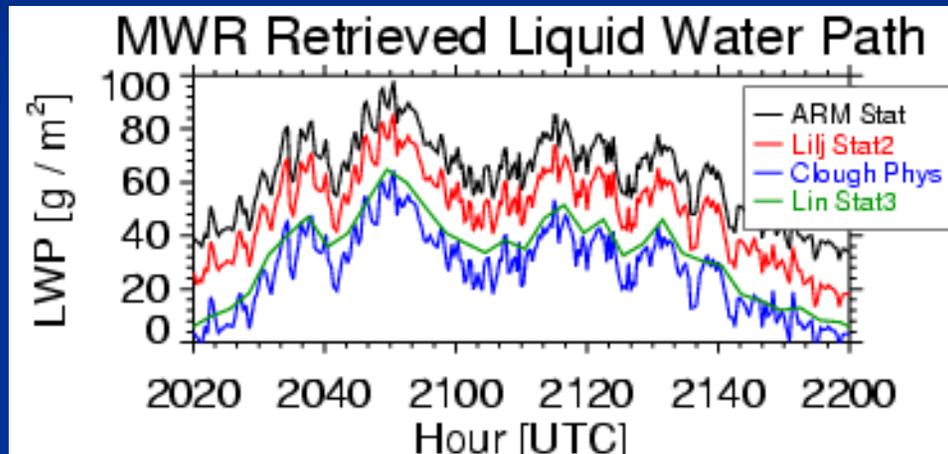
Co-site with the AMF deployment at COPS (Black Forest, Germany)

Objective

- **Deploy one of the new ARM 90/150 GHz MWRs with the AMF**
- **Take advantage of the multiple MWR & other measurements for**
 - 1. Calibration Intercomparisons*
 - 2. MWR Synergy Exercises*
 - 3. Intercompare w/ Vis. & IR Cloud Property Retrievals*

1. Background

MWRs a promising way to get cloud LWP 24/7
But, large diffs exist among MWR methods



**Turner et al., BAMS
Accepted**

2-Channel MWR uncertainties of 25-30 g m^{-2}

- **Microwave absorption models**
 - Spectroscopy
 - Cloud-water dielectric constants
- **Retrieval inversion approach**

2. What's Being Done?

ARM purchasing 90 GHz MWRs

90/150 GHz from RPG

Expect to reduce uncertainty by at least half
e.g., 25-30 g m⁻² to ≤ 15 g m⁻²

However, there are 90 GHz issues to be addressed

- Instrument calibration
- Gas absorption model
- Liquid-water dielectric constants
- Retrieval approach

3. Opportunity: COPS

Convective and Orographically-induced Precipitation Study

International Field Program

June - August 2007

Black Forest region

Objective:

Improve QPF via improved 4-D regional observations of the pre-convective environment, cloud formation, and the onset and development of precipitation

Approach:

Combine remote sensing, ground-based & airborne obs

Multi-wavelength remote sensing of atmospheric state

- Precip radars, Cloud radars, Lidars, MWRs, FTIRs

3. Opportunity, cont.

They submitted a successful proposal for the AMF

Deployment for 9 months, April-December

European instrumentation co-sited with AMF

90 GHz MWR (9 months)

Susanne Crewell, University of Cologne

Same type as ARM, but w/ linear polarization

HATPRO profiler (9 months)

Susanne Crewell, University of Cologne

14 channels, full scanning (azimuth & elevation)

Similar to ARM 12 channel

Water vapor DIAL (IOP and ?)

Volker Wulfmeyer, University of Hohenheim

Absolute water vapor reference (2 to 3%); Scanning

Raman lidar temperature profiles (IOP and ?)

Andreas Behrendt, University of Hohenheim

Temperature profiles compl. water vapor DIAL; Scanning

4. Proposed Studies

Deploy 90 GHz w/ AMF at COPS (9 months)

- 1) Conduct calibration intercomparisons
- 2) MWR Synergy exercises (2x90 GHz, 2-, 12-, 4-chan)
 - Benefits/trade offs of the different channels
 - Evaluate MWR models used in the field
- 3) Intercompare w/ Visible and IR Cloud retrievals
 - Fast-scanning AERI (Turner)
 - 2-NFOV (Chiu, Marshak)
 - MFRSR diffuse (Min)
 - W-Band cloud radar (Microbase)

5. Benefits

1) Intercompare calibrations

- Our 90 GHz
- 12-Channel calibration w/ HATPRO

2) Excellent complementary MWR radiometric database w/ complementary measurements

- Sonde launches (9 months)
- Absolute water vapor reference from DIAL
- Raman temperature profiles

3) Intercomparisons

- MWR models
- Visible/IR/Radar retrievals