Update on Recent QUICR Activities

Shaocheng Xie[1], Alain Protat[2], and Jay Mace[3] (Co-Chairs)

[1]Lawrence Livermore National Laboratory
[2]Centre for Australian Weather and Climate Research
[3]University of Utah

QUICR: Quantification of Uncertainties In Cloud Retrievals

Lawrence Livermore National Laboratory

LLNL-PRES-571334

This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under contract DE-AC52-07NA27344. Lawrence Livermore National Security, LLC

Mission Statement

“to develop a methodology for characterizing and quantifying uncertainties in current and future ARM cloud retrievals, separately for different cloud regimes, in support of both retrieval algorithm improvement and cloud modeling study”

Recent major activities (1)

- **EU / DOE Ground-based Cloud and Precipitation Retrieval Workshop** - *13-14 May 2013, University of Cologne, Germany (Comstock/Turner/Mace)*
  - Discussion Topics: Retrieval algorithm frameworks, forward models, instrument issues, prior datasets, evaluation approaches etc.
  - *Primary outcome and actions*
    - Submitted BAMS manuscript provides general overview of retrieval algorithms, uncertainty sources and path forward for improvement (Turner et al.)
    - *Build cases for joint activities*
    - *Create common guidelines for calibrating and characterizing uncertainty in ground-based instruments*
    - *DOE/ARM Data Portal (http://useu.ornl.gov/cap/) to share data, codes, forward models etc.*
- **Making BBHRP a retrieval evaluation framework** *(PNNL)*
- **Developing a framework for uncertainty quantification and retrieval optimization based on PSUADE and BBHRP** *(LLNL)*

Recent major activities (2)

- **Making progress in addressing uncertainty in in-situ data** *(IcePro-Greg McFarquhar)* **and using in-situ data to evaluate cloud retrievals** *(Zhien Wang)*
- **Enhanced leadership for QUICR –** *Prof. Jay Mace has kindly accepted the invitation to help lead the group*
- **A QUICR session is planned for the upcoming AGU meeting** *(C. Zhao, A. Protat, X. Dong, and E. Clothiaux)*

Future Directions

- Enhance collaborations with other retrieval communities (e.g., EU) through organized group activities, as well as code and data sharing.
- Enhance collaborations with cloud modeling communities to address process-level uncertainty instead of just focusing on individual retrieved variables, such as: *what does the modeling community consider an acceptable retrieval to constrain processes of interest? What are the parameters or set of parameters that are necessary to understand a process? What observations are needed for addressing these modeling needs*?
- Enhance collaborations with IcePro to address the need and uncertainty in in-situ aircraft data
- Enhance collaborations with statisticians to better quantify uncertainties and optimize the retrieval products
- Utilize new instruments in quantifying uncertainties in current retrievals

Quantification of Uncertainty in Cloud Retrievals (QUICR) breakout session

Agenda

Monday, 4 November, 2013

10:15 – 12:00

1. Update on QUICR relevant activities (S. Xie – 20 minutes)
2. Retrievals and their uncertainties: What every atmospheric scientist and meteorologist should know (D. Turner – 15 minutes)
3. MCMC-Based Assessment of the Error Characteristics of a Surface-Based Combined Radar-Passive Microwave Cloud Property Retrieval (D. Posselt – 15 minutes)
4. Characterizing Cloud Distributions as Functional Forms: Uncertainties due to Fitting Techniques and Shattered Artifacts (G. McFarquhar – 15 minutes)
5. Tropical Ice Clouds – where is the ballpark (M. Ahlgrimm – 15 minutes)
6. Discussion (J. Mace/S. Xie ~ 25 minutes)
    - How should we pursue collaboration with the European cloud retrieval community?
    - Should we promote the use of the UQ frameworks (BBHRP/PSUADE) developed (or being developed) at PNNL and LLNL and organize some potential group activities using these tools? (flux check, uncertainties in forward models, comparison with in-situ data); short-term goals? Task leaders?
    - What does the modeling community consider an acceptable retrieval to constrain processes of interest? What are the parameters or set of parameters that are necessary to understand a process? What observations are needed for addressing these modeling needs? Should we expand the scope of QUICK to understand processes in addition to provide an error bar on the retrieved quantities?