Cloud Life Cycle Working Group Opening Plenary

ASR
Atmospheric System Research

Fall Meeting, 12 Sept 2011, Annapolis, MD

CLWG Leadership

Co-Chairs:

Tony Del Genio, Matthew Shupe

Steering Committee:

Jennifer Comstock, Steve Klein,
Steve Kruger, Jay Mace

Translators:

Mike Jensen, Shaocheng Xie
Scott Collis

Please contact us with your feedback and input!

CLWG Mission / Objectives

- Improve & expand observational capabilities to characterize cloud lifecycle processes so they can be better understood and represented in models

- Enable a robust and productive feedback between model-identified needs and observational efforts

- Study topic areas that address key modeling deficiencies AND can be observed with ARM, and collaborating, resources

- Identify programmatic needs & priorities to promote scientific progress: new efforts, instruments, measurement strategies, IOPs

- Identify & address roadblocks that inhibit progress

CLWG Highlights

We need to demonstrate what we do and justify the ASR program

Please upload your highlights!

asr.science.energy.gov/science/research-highlights/submit

Meeting Design

Monday: Plenary then CLWG breakout sessions
Tuesday: CLWG breakout sessions, ***Joint plenary***
Wednesday: CLWG and overlapping breakout sessions
Thursday: CLWG closing plenary, GoAmazon

Thursday plenary –
Breakout summaries, discussion of focus groups and strategic research objectives, prioritization of VAPS, instruments, etc.

Please give us feedback about the meeting: adequacy of time, opportunities to participate, overlap with other WGs.

Meeting Design

Breakouts

- Primarily self organized
- Additional sessions to accommodate submitted topics
- Attempted to minimize conflicting parallel sessions
- Many organized around existing/developing themes
- Emphasis on discussion in order to better develop themes and coordinate research
- Most breakout session leaders will provide a 5 min summary to the full CLWG on Thursday morning

Room Schedule

Monday, September 12

TIME	Mainsail West and Main (180)	Mainsail East (90)	Leeward (45)	Coastal Room East (30)
8:30 AM	Cloud: Plenary (100)	Aerosol Plenary (100)		
10:00 AM	**Break**	**Break**	**Break**	**Break**
10:15 AM	Mixed Organic/Inorganic Aerosol (50) (continues to p.m.)	GVAX	QUICR (20)	CSTAT (30)
12:15 PM	**Lunch**	**Lunch**		**Lunch**
1:15 PM	Mixed Organic/Inorganic Aerosol (50 - Mainsail West)		Midlatitude and Low Clouds	
	Madden-Julian Oscillation (30 - Mailsail Main)	GOAMAZON2014 (2-3PM)		
3:15 PM	**Break**	**Break**		**Break**
3:30 PM	Optical Properties and Radiative Forcing (50)	MC3E (30)		New Particle Formation (25) (continued Tues. a.m.)

Breakout Rooms

All “Mainsail” rooms are on the second floor (here)
Harbor rooms are on the second floor

Leeward, Coastal, and Windward rooms are downstairs

Agenda for all sessions at the entrance to all rooms

- Slides from Tony presented here

Thoughts on CLWG Priorities

Persistence/transitions in low clouds

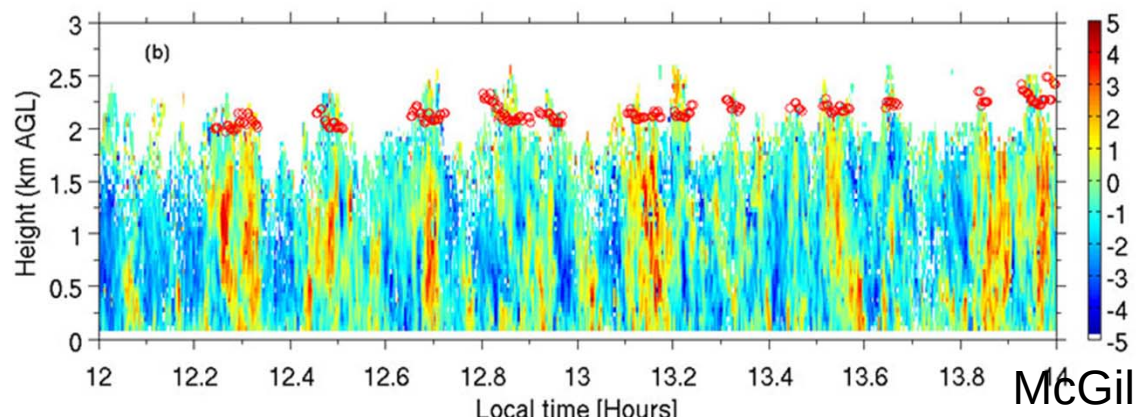
(St, Sc, shallow Cu)

Importance?

- Wide global coverage and important in energy budget.
- Model disagreement/variability

What ASR-CLWG can do?

- Characterize co-evolution of cloud and ABL properties.
- Themes include entrainment, vertical velocity, microphysics, drizzle processes, ABL characterization, surface fluxes
- Expand study/understanding to “ocean” environments.

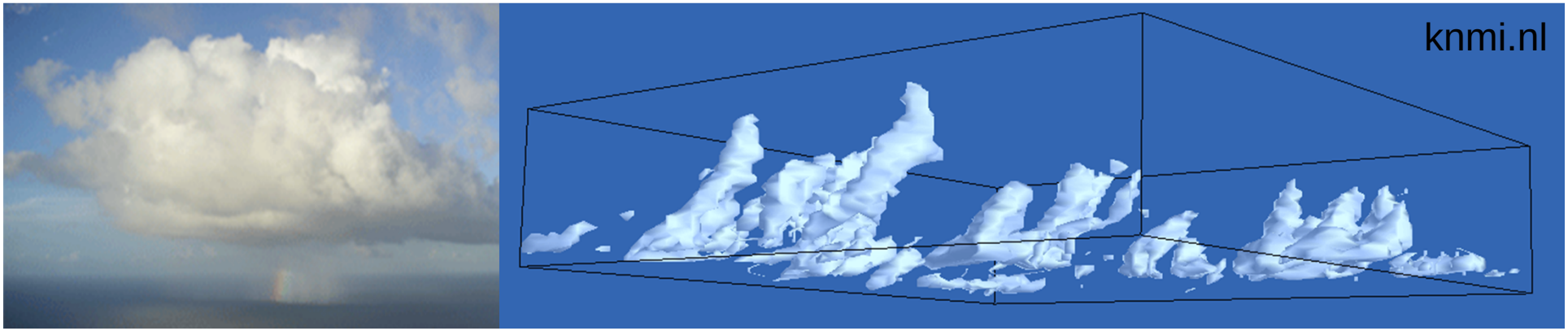


Persistence/transitions in low clouds

(St, Sc, shallow Cu)

Why DOE ASR/ARM?

- DOE has many of the important instruments for making the *comprehensive* measurements needed from a *long term* perspective (in some global locations)
- *Flexibility* to study sites of specific interest
- *Unparalleled abilities* to look from both of these perspectives (fixed, mobile)
- Need close coordination between observations and models
- Critical to proper simulation of global



Convective Life Cycle

Importance?

•Significant impacts on hydrologic cycle, global circulation, vertical distributions

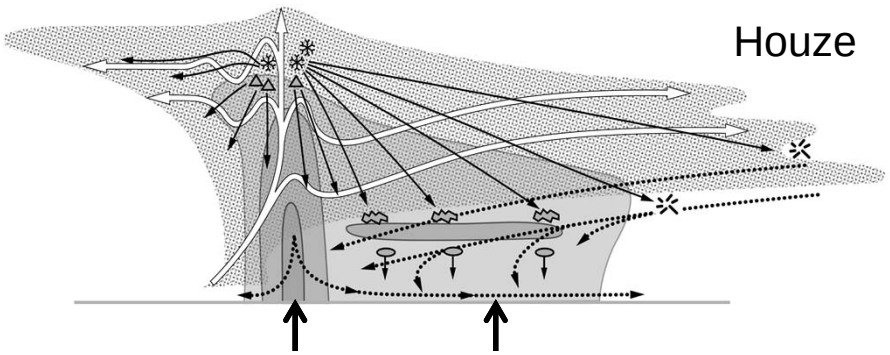
•Important impacts and responses to global modes of variability

•Significant model challenges

What ASR –CLWG can do?

•Characterize: larger-scale organization and environment, initiation conditions, diabatic heating, microphysics

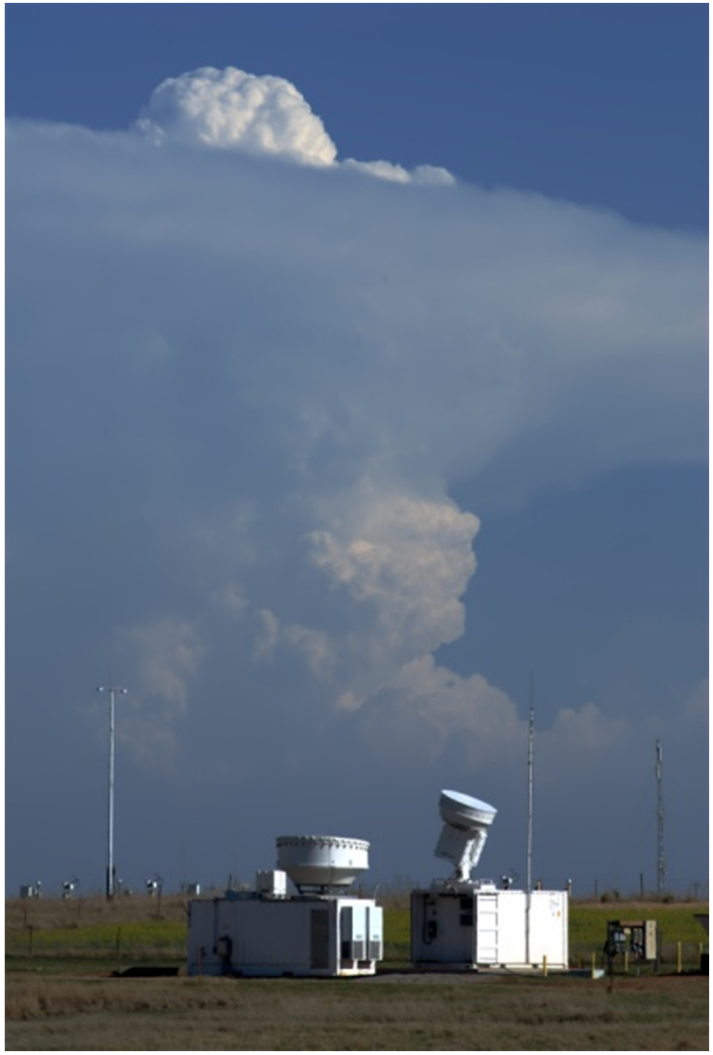
•Understand impacts on upper clouds, moisture, precipitation, regional environment, feedbacks on the general convective state



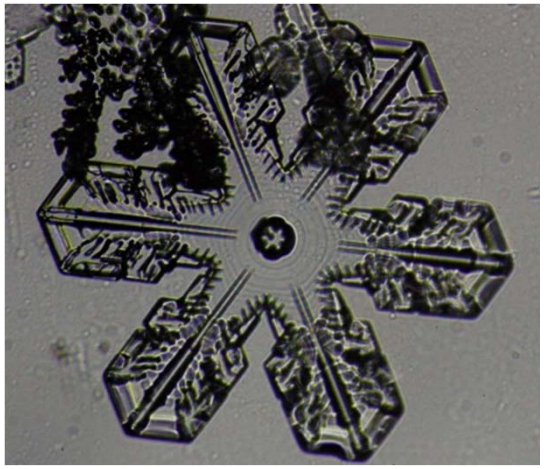
Convective Life Cycle

Why DOE ASR/ARM?

- Need coordinated observations of clouds, precipitation, and many aspects of the surrounding environment
- DOE has many of the primary instruments that are needed at specific locations
- Need close/coordinated work between observation and model perspectives that can be facilitated by the ARM/ASR approach.



Ice Size Distribution



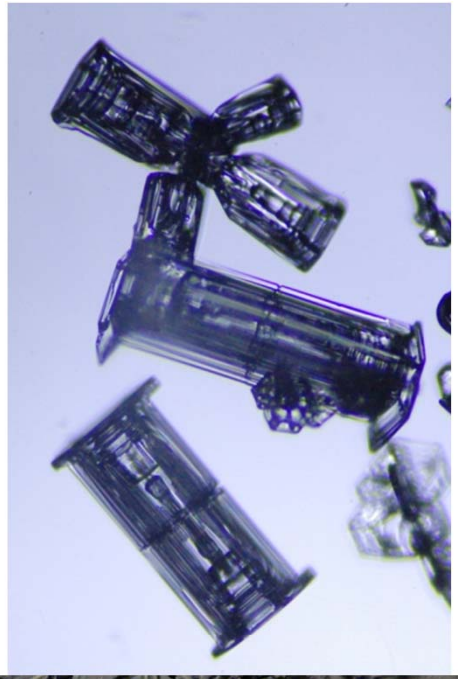
Importance?

- Implications for all cloud types, radiation, fall speed, large model sensitivities
- Interpretation of remote-sensing observations
- Impacts retrieval and model assumptions

What ASR-CLWG can do?

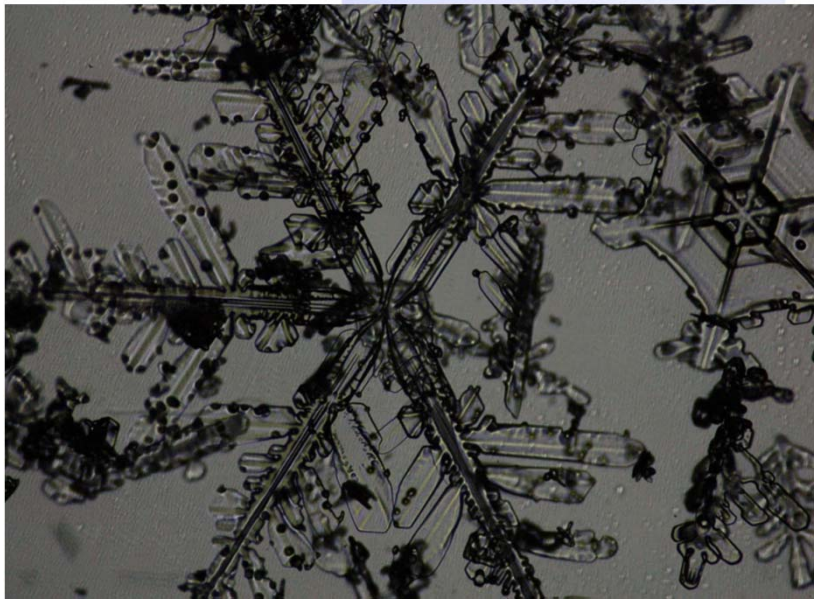
- Solve the small particle issue!
- Attain mass, number, and radiative closure
- Contribute towards better understanding of fall speed, precipitation processes
- Interprete historical measurements that are the basis for many existing parameterizations

Ice Size Distribution



Why DOE ASR/ARM?

- DOE has contributed a lot to this effort over the past years including in situ observations, remote sensing, and modeling. (i.e., lots of expertise)
- Requires this multi-faceted approach, particularly for closure.
- Significant impact on radiation and global climate modeling.



Focus Groups in CLWG

http://asr.science.energy.gov/science/working-groups/focus-groups

Focus Groups

A framework for integration of research activities …and accelerated progress

Overall Objective

To provide a framework for organizing, coordinating, and supporting scientific efforts that are of strategic importance to ASR yet are substantially larger than any individual PI effort. Typically these groups will focus on a specific process that is not well understood and modeled. The results, products, and/or output from these groups will comprise some of the important deliverables that help to define ASR and its progress.

Focus Groups

3 recently approved by the SISC

1) Vertical Velocity (CLWG)
2) QUICR (CLWG)
3) New Particle Formation and Growth (ALWG)

Vertical Velocity Focus Group: Objectives

Short term

Develop white paper on status of vertical velocity measurements using ground-based observations

Prioritize VV products (Importance, Maturity, Level of effort, validation strategy)

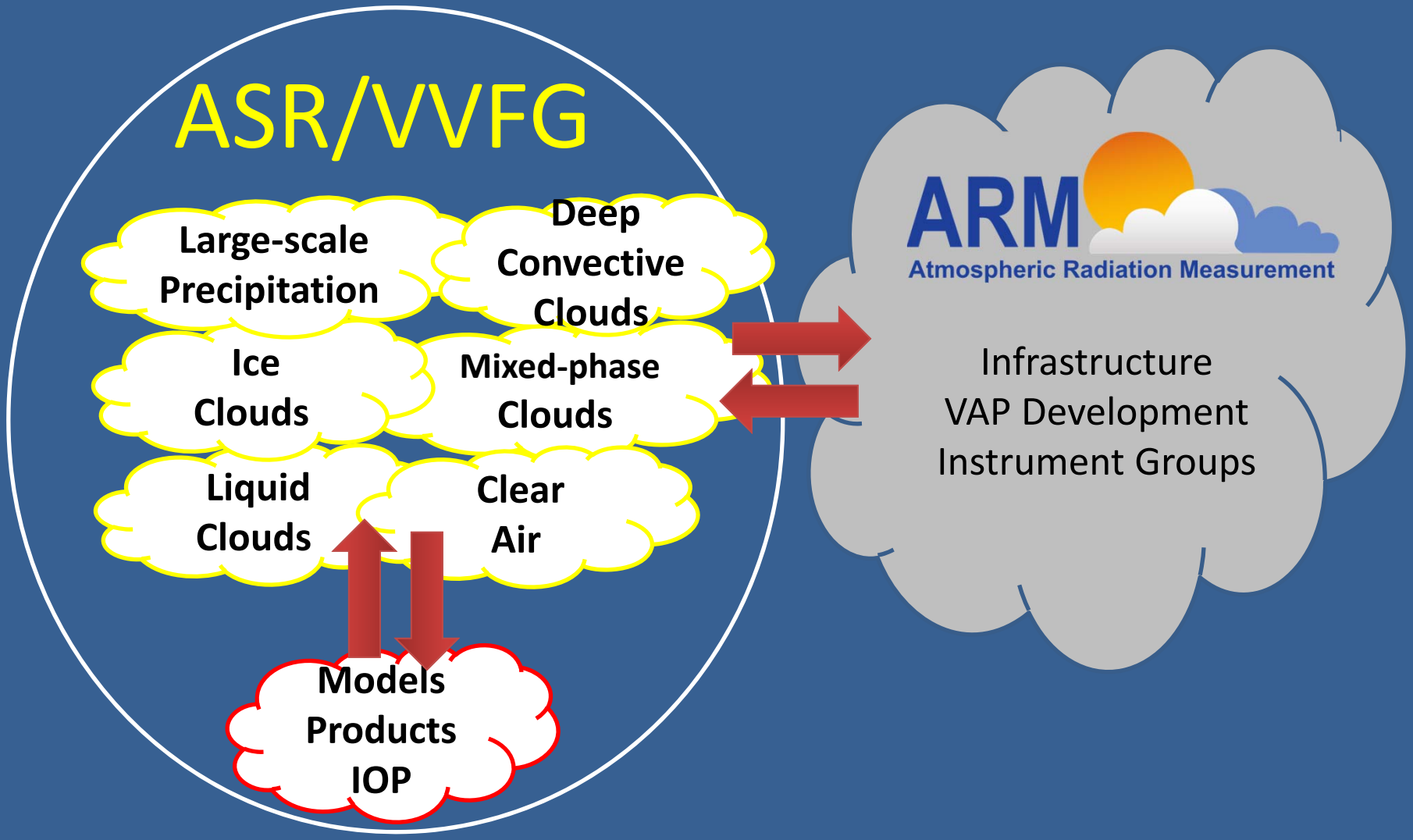
Identify a few VV products that will be pushed towards production (eventually available at the ARM archive)

Long term

Integrated suite of algorithms for VV products at all sites and all cloud and precipitation conditions - Active role in future IOP's

Enhance our understanding of how cloud system dynamics impact cloud microphysics and cloud lifetime

Vertical Velocity Focus Group: Organization

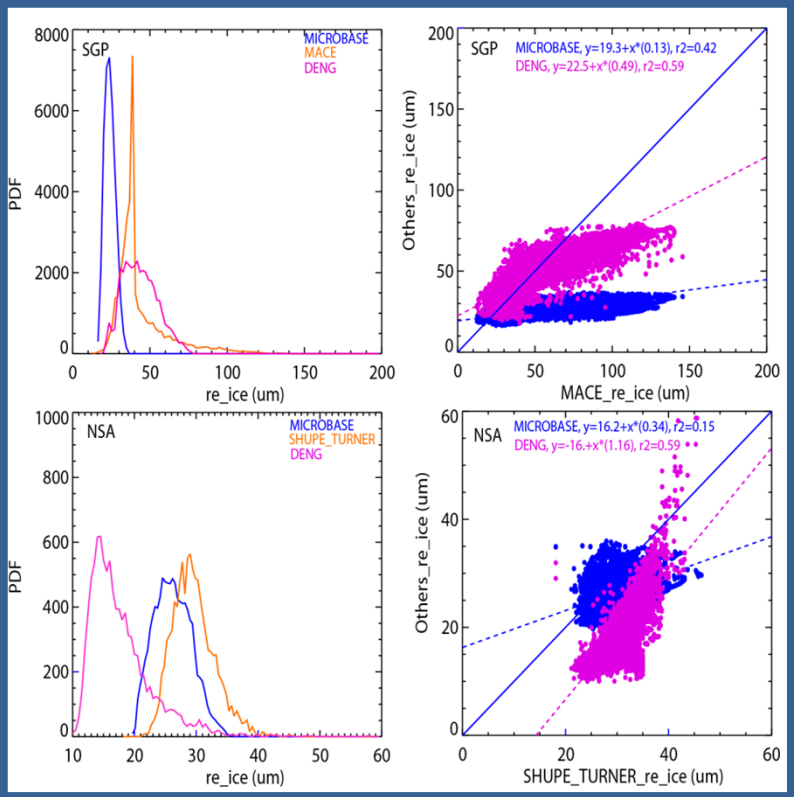


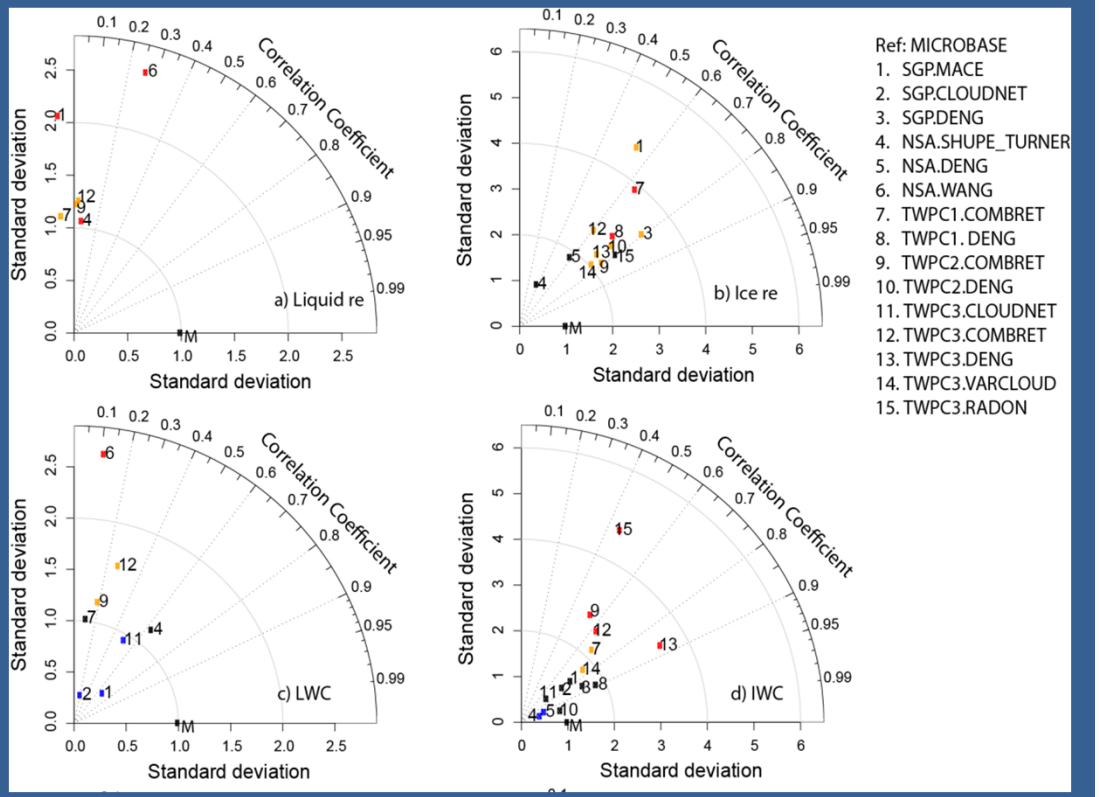
QUICR Focus Group: Objectives
(Quantification of Uncertainty in Cloud Retrievals)

- Systematically analyze differences in current widely accepted cloud retrieval algorithms/products
- Understand potential uncertainties in each algorithm
- Evaluate accuracy of, and test assumptions in, cloud retrievals
- Evaluate value of more complex retrievals (limited applicability) compared to simple ones (easy, broad application)
- Apply advanced statistical methods to quantify uncertainties for different cloud regimes

QUICR Focus Group: Approaches

1. Create an ensemble cloud retrieval data set (CRED)
2. Systematically evaluate retrievals using BBHRP, in situ, and other methods
3. Implement advanced statistical methods to quantify uncertainties





General SISC Feedback on Focus Groups

- Need specific plans with tangible details and milestones
- Clear prioritization of activities
- Should have documented participation (who is participating and what will they be doing)
- Need to facilitate work that would not otherwise occur and that is larger than a specific PI effort.

Other organizational activities

Madden-Julian Oscillation (MJO)
Convective-Stratiform-Anvil Transition (CStAT)
Ice physical and radiative processes
Entrainment

Drizzle?
Boundary Layer Mixing?

Are there others? Please let us know.