2016 ARM/ASR Joint User Facility and PI Meeting

BREAKOUT SESSION AGENDAS

Monday, 1:00 pm – 3:00 pm, Breakout Session 1

Eastern North Atlantic: combining modeling and observations (Wood/Miller) [Fairfax]

Purpose: to share and discuss observational and modeling work focusing on the Eastern North Atlantic (ENA) site; to identify needs for data products and field experiments; to discuss how to make the best use of ENA data in combination with modeling to address key ASR science goals for warm, low clouds.

Presentations:

Time	Speaker [affiliation]	Title
1:00-1:05	Rob Wood [U. Washington] and Mark Miller [Rutgers]	Introductions and motivation
1:05-1:20	Xue Zheng [LLNL]	Using ARM observations from the Azores to better understand the biases of low cloud and its surface cloud radiative effect in CAM5
1:20-1:35	Peng Wu [U. North Dakota]	MBL cloud and drizzle properties under various atmospheric conditions
1:35-1:50	Richard Forbes [ECMWF]	How can we make best progress in constraining drizzle production and evaporation rates in a global model?
1:50-2:05	Jianjun Liu [U. Maryland]	Response of Marine Boundary Layer Cloud Properties to Aerosol Perturbations Associated with Meteorological Conditions from the 19-month AMF-Azores Campaign
2:05-2:20	Rob Wood [U. Washington]	Low CCN concentration events over the ENA: seasonality, meteorology and drivers
2:20-2:35	Jian Wang [BNL]	The ACE-ENA G-1 aircraft deployments in the Azores – plans
2:35-2:50	Richard Moore [NASA Langley Research Center]	Overview of the NASA North Atlantic Aerosols and Marine Ecosystems Study (NAAMES)
2:50-3:00	Discussion	Needs for data products, VAPs. Future plans

Cloud phase group (de Boer) [Great Falls]

Session Description: This session will provide a forum to discuss several areas of interest to ARM and ASR -- specifically, the balance of hydrometeor thermodynamic phase in the atmosphere, the impact of aerosols on selection of that phase, and the ultimate radiative impact of this balance. Current efforts to understand cloud phase and cloud properties are numerous within the ASR program, and these studies use measurements from a variety of ARM sites.

This session will provide time to follow up on ongoing activities related to understanding cloud phase. Specifically, we hope to be able to wrap up the ongoing case study effort. Additionally, we will be looking to chart a new direction for people interested in this topic to perform collaborative research linking several individual PI projects.

New particle formation (Smith/McMurry/Kuang) [Ash Grove]

The primary objective of the breakout is to build and strengthen collaborations among DOE ASR new particle formation scientists. This work requires interactions among experimentalists, theorists and modelers.

1. Overview of "New Particle Formation: Future Research Needs."
2. Discussion of ongoing ASR NPF collaborations.
3. Ideas for new ASR NPF collaborations.

<u>Monday, 3:30 pm – 5:30 pm Breakout Session 2</u>

Simulating radar observables from model microphysics: progress and applications (Collis/Xie) [Fairfax]

3:30 - 3:40 Intro and updates (Scott Collis)

3:40 - 4:00 Overview of POLARRIS: Motivation, Application, and Architecture (Toshihisa Matsui)

4:00 - 4:20 The Development and Applications of a Polarimetric Radar Forward Operator to Improve Microphysical Parameterizations and Study Deep Convective Storms (Jeff Snyder)

4:20 - 4:40 GCM-SIM: Latest updates and applications (Shaocheng Xie)

4:40 - 5:00 CR-SIM: Latest updates and applications (Pavlos Kollias)

5:00 - 5:30 Discussion

The session will conclude with 30 minutes of discussion. The following initial discussion questions are proposed:

1) Once investigators have forward simulated radar moments what are some methods for comparing against observations?

2) How to represent and allow for uncertainties (or more correctly lack of information) due to the simplicities of microphysical schemes

3) To build a smart or a dumb simulator? Should we build in information into the simulator that does not exist in the model microphysical scheme?

4) What is occurring outside of DoE and the USA? Can we learn from other communities?

ARM data and compute capabilities for PIs and users (Palanisamy) [Ash Grove]

Session description: This session will advertise the compute capabilities (GPU Capabilities/Visualization Tools) that are currently available to the users and gather

feedback from existing users of these capabilities. It will also discuss how to improve your scientific impact factor by providing good quality data and metadata. The ARM Strategy Team (ASST) members will also discuss the data and compute services vision using the recently developed data vision white paper and collect feedback and user requirements.

Secondary organic aerosol (Shilling) [Great Falls]

Session description: The guiding philosophy for cooperative science of the Secondary Organic Aerosol (SOA) Group, both for incorporating knowledge into models and identifying new and important emerging topics for study, is to focus on processes of SOA formation and reactivity that are missing in global climate models and have large potential implications on radiative forcing. The goals of the session are: to share and discuss the latest results ASR/ARM funded SOA researchers including laboratory, field, and modeling efforts and to plan for future collaborative efforts and emphases.

Advances in aerosol and cloud retrievals from spectral radiometers (Riihimaki) [Potomac]

Description: Spectral radiometers are used to retrieve key column cloud and aerosol properties (e.g. optical depths, aerosol absorption, liquid water path, etc.) with high quantitative accuracy, and ARM has invested in a number of new measurement and retrieval techniques. The goals of this session are: 1) to inform the community about recent or upcoming improvements in spectral radiometer measurements and retrievals, with a particular focus on hyper-spectral radiometer measurements; and 2) discuss priorities and a path forward for community collaboration on spectral radiometer data quality and retrieval development.

Presentations:

ARM Infrastructure updates: (30 min)
*Laura Riihimaki—MFRSR 1625 nm channel
*Rick Wagener—Implementing Christine Chiu's 3-channel Cimel cloud retrieval
*Justin Monroe—New VAP data quality efforts supporting MFRSR, spectral shortwave

New hyper-spectral retrievals: (30 min)
*Dave Turner--New AERIoe retrieval
*Weidong Yang/Sasha Marshak -- SAS cloud retrieval from MAGIC
*Joe Michalsky-- RSS data/aerosol retrievals from Aug 2009-Mar2014

Hyper-spectral Shortwave Retrievals and Data quality: (60 min)
*Connor Flynn—update on SAS data quality and current operational AOD retrievals
*Discussion about priorities and path forward for SAS data quality & other spectral radiometer needs

Monday, 7:00 pm – 9:00 pm Evening Breakout 1

Entrainment (Krueger) [McLean]

Session description: The purpose of this breakout session will be to share and discuss progress on the development and application of methods to estimate entrainment rates using ground-based remote sensing or airborne ARM measurements.

Entrainment affects many important properties of clouds, particularly those of cumulus and stratocumulus clouds. The small turbulent eddies responsible for entrainment cannot be resolved in global climate models, so entrainment must be parameterized in such models, in particular, as important and uncertain parts of cumulus parameterizations and stratocumulus-topped boundary layer parameterizations.

Entrainment parameterizations have been difficult to develop and test. LES (large eddy simulation) models are capable of resolving the entraining eddies, but still need to be evaluated against observations. LES can also be used to help develop and test methods for estimating entrainment.

We encourage and solicit discussion of any aspects of entrainment measurements and parameterization during the breakout session. Some potential discussion topics include:

• How can GCM parameterizations of the entrainment rate in cumulus updrafts and in stratocumulus-topped boundary layers be improved?

• What ground-based entrainment rate retrievals are available?

• What airborne cumulus entrainment rate retrievals are available?

• How useful is LES for better understanding of the entrainment process in cumulus and stratocumulus clouds?

AOS harmonization (Flynn) [Potomac]

Session Description: The AOS Harmonization represents an approach to integrating the efforts of ARM operations and AOS technical experts to improve measurement quality, and to provide datastreams with uniform content and consistent processing and documentation.

This session will review AOS Harmonization concept, present results of harmonized processing of MAO AOS optical measurements comparing collocated measurements, summarize ongoing efforts, and solicit feedback for next actions.

ARM Data Quality: what you need to know (Kehoe) [Great Falls]

Session Description: Data quality information on ARM instrumentation comes in a few different formats and can be challenging to decipher, but it does not have to be. Please join the ARM Data Quality Office on Monday, May 2nd from 7-9 pm to learn more about working with ARM data quality information and have a discussion on current methods and areas of improvement.

GoAmazon2014/5 – Clouds, precipitation, and organized convection (Machado/Feng) [Ash Grove]

The purpose of this breakout session is to facilitate discussion on how to better make use of the recently completed GoAmazon observations and ongoing modeling activities to address some of the relevant science challenges outlined by the recent ASR Workshop on Convection held at PNNL. Some of the science questions include:

- Relevant processes leading to organized convection through a seamless sequence, manifested as the diurnal cycle
- Observations and understanding of convective dynamics, microphysics and their interaction
- Sources of low predictability skill of precipitation and convection in climate models
- Advances and challenges in cloud permitting model in simulating organized deep convection

We will have short presentations (10 min each) from each PI currently involved in GoAmazon atmospheric component activities to touch on some of the science questions above, and more importantly, sufficient time to discuss future activities and collaborations to better tackle these challenges.

Presentations:

Rong Fu: Understand the processes that control shallow to deep convection development and their representations in climate models using GoAmazon data

Zhe Feng: Challenges in simulating convective clouds in cloud-permitting model and how could GoAmazon observations help

Mike Jensen: Observational analysis of the shallow-to-deep convection transition during GoAmazon

Scott Giangrande: Convective Cloud Vertical Velocity and Mass-Flux Characteristics from Radar Wind Profiler Observations During GoAmazon 2014/5

Jiwen Fan: Impacts of Manaus Plume on Convective Clouds and Precipitation in the Downwind Pristine Environment

Luiz Machado: Sensitivity of Cloud and Precipitation to Aerosol, Surface and Thermodynamics in Amazonas

Shuaiqi Tang: Large-scale Structure Derived from GoAmazon2014/5 Experiment: Diurnal Cycle and the Related Convective Systems

Virendra Ghate: On the controls of daytime precipitation during the Amazonian dry season

<u>Tuesday, 7:30 pm – 9:00 pm, Evening Breakout 2</u>

The Cloud, Aerosol, and Complex Terrain Interactions (CACTI) ARM field campaign (Varble) [Great Falls]

The goals of this session are to:

(1) Present a broad overview of the motivation for, the experimental design of, and science questions to be addressed by the upcoming CACTI ARM field campaign,

(2) Provide background information on the potential complementary RELAMAPAGO NSF field campaign,

(3) Solicit feedback from members of the ARM and ASR community regarding measurement priorities, feasibility of measurement strategies, prioritization of science questions, and potential involvement of specific individuals, and

(4) Generate plans for preparation ahead of the field campaign including possible testing of new radar scanning strategies using simulators and an SGP IOP.

Anyone interested in prediction of deep convective initiation, mesoscale convective organization, aerosol interactions with convective clouds, land surface interactions with boundary layer clouds and precipitation, and orographic impacts on weather and climate should consider attending this session and providing input into discussions that could influence the outcome of CACTI.

MARCUS: Measurements of Aerosols, Radiation and Clouds over the Southern oceans (McFarquhar) [Potomac]

The goals of this session are to:

(1) Present a broad overview of the motivation for, the experimental design of, and science questions to be addressed during MARCUS,

(2) Provide background information on the potential complementary NSF SOCRATES field campaign,

(3) Solicit feedback from members of the ARM and ASR community regarding any aspect of MARCUS or any auxiliary measurements (e.g., feasibility of any measurement strategies, or prioritization of science questions, analysis strategies), and

(4) Encourage involvement of anyone interested in conducting coordinated modeling studies, such as those designed to understand processes responsible for the bias in absorbed shortwave radiation in summer in models and for the production of copious supercooled water in Southern Ocean cloud systems.

Anyone interested in observational or modeling studies of Southern Ocean clouds, aerosols, radiation and precipitation should consider attending the session and providing input into the discussions.

CAUSES: Clouds Above the United States and Errors at the Surface (Morcrette) [Vienna]

19:30 Introduction to CAUSES (Cyril Morcrette)

19:40 Warm bias contribution from surface water and energy budgets (Hsi-Yen Ma)

20:00 Diagnosis of the Warm Bias Exhibited in CMIP5 AMIP Simulations over ARM SGP Site (Chengzhu Zhang)

20:20 Attribution Study of Surface Temperature Biases in GCMs (Kwinten Van Weverberg)

20:40 Areas for future work (Cyril Morcrette)

20:45 Open discussion

21:00 Close

GoAmazon2014/5 - Aerosol & atmospheric chemistry (Martin/Artaxo) [Ash Grove]

Session description: The purpose of this breakout session is to facilitate discussion on how to better make use of the recently completed GoAmazon observations and ongoing modeling activities to address some of the relevant science challenges related to aerosol production and effects. Importantly, there will be sufficient time to discuss future activities and collaborations to better tackle these challenges.

UAS & tethered balloons (Schmid/Ivey) [McLean]

Mark Ivey	Welcome and introduction (5 min)
Gijs de Boer	COALA/ERASMUS small UAS campaigns (15 min)
Beat Schmid	ARM UAS Implementation Plan (10 min)
Beat Schmid	AAF UAS capabilities update (10 min)
Dari Dexheimer	Oliktok Tethered Balloon capabilities update (15 min)
Gijs de Boer	Oliktok Summer 2016 UAS and Tethered Balloon activities (15 min)
Mark Ivey	Oliktok requirements for UAS operations (10 min)
Nicki Hickmon	SGP requirements for UAS operations (10 min)
Mark Ivey	Lead discussion (30 min)

<u>Wednesday, 1:30 pm – 3:30 pm Breakout Session 3</u>

Radar data products for process studies and modeling applications (Jensen/Kollias) [Ash Grove]

The purpose of this session is to discuss priorities and needs for radar data products with a focus on process studies and modeling applications. In particular, we will discuss the capabilities of the SACR systems, Radar Doppler Spectra, and the integration of profiling and scanning (cloud and precipitation) radar observations at the ARM sites (e.g. LASSO). Data quality and uncertainty needs for the radar systems will also be a focus of the discussion.

1:30 - 1:40 PM Scanning Cloud Radar Products - Beyond SACRCORR (Katia Lamer)

1:40 - 2:00 PM Discussion

2:00 - 2:10 PM Radar Doppler Spectra Products - Next steps for MicroARSCL (Ed Luke)

2:10 - 2:30 PM Discussion

2:30 - 2:40 PM Convective Vertical Velocities (Scott Giangrande)

2:40 - 3:00 PM Discussion

3:00 - 3:10 PM DSD Retrievals and Hydrometeor Classification (Chandra)

3:10 - 3:30 PM Discussion

Ice nucleation (Liu) [McLean]

The purpose of this breakout session is to review the progress on ice nucleation from laboratory, in situ and remote sensing observations to modeling studies at different scales in the past year, to identify the remaining issues/knowledge gaps, and to come up with short-term and long-term action plans. Ice nucleation is a critical process of ice generation in mixed-phase and cirrus clouds, and it has been shown to affect cloud properties and radiative forcing significantly. Yet, there are still large unknowns with this process and its representation in models. ARM has co-supported the Fifth International Ice Nucleation (FIN) Workshop, which was conducted in three phases (FIN-1 in November 2014, FIN-2 in March 2015, and FIN-3 in September 2015), and has generated interesting results/findings regarding the inter-comparability of measurements of ice nucleating particles and their compositions. In addition, a variety of related activities are supported by ARM/ASR.

1:30-1:40 Paul DeMott: Ambient ice nucleating particle measurements in FIN03 and other recent studies

1:40-1:50 Alla Zelenyuk-Imre: Single particle characterization of ice nuclei using miniSPLAT

1:50-2:00 Xiaohong Liu: FIN02 referee report on “blind” intercomparison of ice nucleating particle measurements

2:00-2:10 David Mitchell: The dependence of cirrus cloud formation mechanism on latitude, season and surface type

2:10-2:20 Fan Yang: Microphysical consequences of the spatial distribution of ice nucleation in mixed-phase stratiform clouds

2:20-2:30 Daniel Knopf: The role of ice nucleating particle surface area in interpretation of immersion freezing

2:30-2:40 Jin Yang: Liquid/ice mass partition in convective clouds: observational and modeling studies

2:40-3:30: Open discussion (on remaining issues/knowledge gaps, and short-term and long-term action plans)

Aerosol mixing state focus group (Riemer) [Great Falls]

Session description: This focus group studies the sensitivity of climate-relevant properties of particles to the aerosol mixing state and the level of complexity needed to represent these properties in models. This focus group bridges what is learned from aerosol property measurements, process-centered focus groups, and the modeling community in order to improve the representation of aerosol mixing state in regional to global scale models. The session brings together active participants from these different communities in ASR under one framework.

The mixing state focus group thrives on the interaction and dialogue of modelers and experimentalists, and the session will provide a forum for this interaction.

Specific goals are to (a) give the contributors of the focus group a forum for highlighting their progress, (b) to assess progress of the focus group as a whole, and (c) to identify needs and avenues to move forward.

MAGIC (Lewis) [Potomac]

Ernie Lewis: Introductory remarks

Greg McFarquhar: "An overview of MARCUS"

David Painemal: "Aerosol proxies and their co-variability with cloud microphysics during MAGIC"

Rob Wood (and Johannes Mohrmann): "Using MAGIC data to constrain the marine boundary layer CCN budget in the Sc-Cu transition region"

Weidong Yang (NASA): "Spectrally-invariant properties of clouds in transition zones during MAGIC"

Chris Bretherton (and Jeremy McGibbon): "Comparison of ship-following large-eddy simulations with cloud and boundary layer structure observed in MAGIC"

Ed Luke: "MBL cloud rain rate retrievals during MAGIC"

Maike Ahlgrimm: "Ship-following single-column model preliminary results – a proof of concept"

Instrument and measurement focus group for broadband radiometric measurements (Long) [Vienna]

Mark Kutchenreiter (or other NREL):
1) Update on status of calibration of PIRs and LW BORCALs
2) Update on status of ventilator issues, incl. increased air flow inlet (holes in plates under ventilators) and increased screening size design.
3) Discussion?

Joe Michalsky: Absolute IR Radiometer comparison campaign at the SGP Update

Laura Riihimaki:
1) procedure for updating the calibration information in the raw data files when an instrument is changed
2) estimating broadband from the MFRSR data for QCRAD

Mike Ritsche: ventilators for downward-facing radiometers in the cold climate regimes, review and discussion.

Mike Reynolds: description of new ShipRad system development.

<u>Wednesday, 7:30 pm – 9:00 pm, Evening Breakout 3</u>

Aerosol and Cloud Experiments in Eastern North Atlantic (ACE-ENA) (Wang) [Great Falls]

Session description: Update and discussion of the planning of ACE-ENA campaign

MOSAiC (Shupe) [Potomac]

The international MOSAiC project will consist of a research icebreaker drifting with the Arctic sea ice for a full year (2019 to 2020) making comprehensive, coupled-system measurements of the atmosphere, sea ice, and ocean. The primary aims are to understand the annual evolution of Arctic sea ice including vertical fluxes of heat and momentum and their drivers. Clouds, radiation, precipitation, aerosols, and atmospheric structure all play central roles in the project and will be measured using the AMF2 and MAOS. Substantial planning continues, including coordination with many international and national partners. This session will provide:

1) An overview on the projects status, specifically including new information on scientific implementation and plans to engage additional US agencies.

2) The opportunity for short volunteered presentations on relevant research topics.

3) Discussion on appropriate topics including the general approach to aerosol measurements, possible additional measurements that are needed, the general approach to cloud measurements, products that can facilitate modeling, etc.

The session is open to all. Specific questions can be directed to Matthew Shupe (matthew.shupe@noaa.gov).

Update on the LES ARM Symbiotic Simulation and Observation (LASSO) project (Gustafson/Vogelmann) [Ash Grove]

Session Description: We know many of you have questions about the ARM facility's plans and progress toward implementing a routine LES modeling component to supplement the extensive observations made at the Southern Great Plains megasite. The LASSO project will have time during a plenary session to present a short overview of the plans. This evening session will allow us to go into more detail. We will have talks from the LASSO team regarding various aspects of the LASSO pilot project, e.g., the modeling workflow, model forcing generation, and metrics/diagnostics calculated as part of the planned data products. We plan ample time for questions and comments—your feedback will be an important part of the session.

Lidar applications (Newsom) [Vienna]

Session Description: The goal of this breakout session is to provide an opportunity for lidar-system mentors, members of the science community, and ARM management to discuss issues related to the various "advanced" lidar systems, i.e. the HSRL, Raman and Doppler lidars. Presentations will be given that summarize recent and planned activities, as well as the status of instruments and data products. A major emphasis in this year's meeting will be on the CHARMs field project (3-beta, 2-alpha aerosol retrieval effort), and on the reconfiguration of the SGP site.

Thursday, 8:30 am – 10:30 am Breakout Session 4

Aerosol measurements: progress, issues, and needs (Mather) [Great Falls]

Welcome and Overview (Mather) 5-10 minutes

- Motivation for the breakout: *Develop a better understanding of how ARM can optimize its efforts in the area of aerosol measurements to best serve the community*.
- ARM wants and needs for community feedback

Recent AMSG Activity (McComiskey and Sisterson) 5-10 minutes

- AMF1 MAOS Restructure
- New AOS Core Configuration

MAOS Operational Strategy

- Science resulting from MAOS deployments (presentation(s)) 30 minutes
    - Larry Berg
    - Q&A
        - Who has used multiple MAOS data streams?
        - Modeling or process study?
        - How was data access and data quality?
        - What were measurement gaps?
        - What were documentation gaps?

- Uses and operational challenges of ARM-owned MAOS instruments (+ACSM) 30 min
    - ACSM, PTRMS, PILS – Tom Watson
    - Wet neph/Humidigraph System, NOx/NOy – (status and plans from BNL mentor group)
    - Role of guest instruments?
    - Field deployment logistics and challenges – Kim Nitschke/Allison Aiken 5-10 min

- Discussion
    - What is the best instrument complement and operational strategy for the MAOS?
    - What do we get from each instrument but also the full suite as we define it?
    - Are all of the AOS core measurements appropriate for all locales?
    - Reaching closure on the AOS Core configuration and the MAOS restructure plan
    - What are the measurement gaps?
    - Differentiate 'wants' for new research directions and 'needs' to fulfill a core set of data products needed to characterize aerosol radiative forcing and its variability and drive models

Additional Discussion Item Given Time

- What are site-specific needs?
    - SGP (for LASSO)
    - NSA (BRW and OLI)
    - ENA
    - AMFs (e.g. MARCUS)

Organization of convection (Hagos and Houze) [Fairfax]

Session Description: An ASR workshop on convection was held at PNNL last February. The workshop discussed strategies for representation of convection in the next generation of climate models and was organized around the following two overarching questions:

1. What are the main challenges/opportunities in data, parameterization, our basic understanding of convection processes, and the integrations among them?

2. How can ASR meet (take advantage of) them given DOE capabilities (ARM, high performance computing) and needs (ACME and other model development efforts)?

In this breakout session, we will present a summary of the discussions and outcomes of the workshop and give persons who did not attend the workshop an opportunity to share their perspectives. After that we will have time for discussion. We encourage everyone, but especially those who were not at the workshop, to attend and provide their input.

Presentations:
• *"Description of the workshop and summary of the Draft Report"* **S. Hagos and R. Houze** *(20 min)*
• *"How to use ARM observations and cloud-resolving/LES models to guide convective parameterization?"* **Guang Zhang** *(10min)*
• *"The Initiation, Organization and Strength of Convection"* **Susan C. van den Heever** *(10 min)*
• *"Validating vertical velocity and microphysics produced by numerical models; issues and some future directions"* **Steven Rutledge** *(10min)*
• *"A new framework for cumulus parametrisation informed by ARM data"* **Christian Jakob** *(S. Hagos presenting) (10 min)*

Discussion:
• Any questions or comments for the presenters.
• Does the workshop report, as summarized here, adequately represent the consensus of the community? What are its strengths and weaknesses?

New tools to bridge the gap between models and observations (Xie) [Potomac]

Session Description: The goal of the session is to address one of the big challenges that ARM and ASR are facing: how to bridge the gap between models and observations? We will discuss a few new tools that are being developed by ARM to support ASR cloud modeling studies and GCM parameterization developments, as well as ARM data processing and discovery. They include ARM diagnostic packages and radar simulators for both LES and GCMs, the ARM Data Integrator (ADI) for data processing, and new data discovery tools.

Presentations:

- Introduction to the session" the new tools to bridge the gap between models and observations" (Shaocheng Xie/Laura Riihimaki/Scott Collis) (10 min)
- ARM/ASR modeling testbeds (covering CAPT, AMT, RRM) (Shaocheng Xie) (15 min)
- Tools for finding, merging, downloading, and processing ARM data (ADI, Py-ART, discovery tools) (Laura Riihimaki/Scott Collis) (20 min)
- ARM diagnostics packages (Shaocheng Xie)

    - ARM diagnostics package for GCMs (Chengzhu Zhang) (10 min)
    - LES diagnostics package (Andy Vogelmann/Tami Toto) (10 min)
    - Discussion (10)
- ARM simulators (Scott Collis)
    - Cloud radar simulator for GCMs (Yuying Zhang) (5 min)
    - Simulators for LES/CRMs (Pavlos Kollias) (5 min)
    - Discussion (10 min)
- New VAPs for supporting cloud modeling studies (Laura Riihimaki) (20min)
- Wrap-up (Shaocheng Xie/Laura Riihimaki/Scott Collis) (5 min)

Aerosol effects on warm clouds (Ghan) [Ash Grove]

Purpose: Representing aerosol effects on warm clouds continues to be a challenge in climate modeling and a major source of uncertainty in estimates of radiative forcing of climate change. The session considers new approaches using a synthesis of modeling and observations at a variety of special scales.

Steve Ghan: Constraining factors driving aerosol effects on cloud radiative forcing

Graham Feingold: New approaches to quantifying aerosol influence on the cloud radiative effect

Cheng Zhou: Why a GCM may overestimate the aerosol cloud lifetime effect: A comparison of CAM5 and CRM using ARM observation

Jim Hudson: Cloud processing of aerosol

Yangang Liu: Regime dependence of aerosol-cloud interaction

Zhanqing Li: Ground-based remote sensing studies

Jiwen Fan: Coupling spectral-bin cloud microphysics with the MOSAIC aerosol model and simulation of warm clouds from VOCALS

<u>Thursday, 10:45 am – 12:45 pm Breakout Session 5</u>

Radar Doppler spectra: Recent progress in retrievals and model-observation intercomparison (Luke) [Fairfax]

10:45 - Introduction and status of radar Doppler spectra collection (Ed Luke)

11:00 - Potential of higher moments of the radar Doppler spectrum for studying ice clouds (Max Maahn)

11:15 - Use of Oliktok Ka/W-band SACR-2 polarimetric and KAZR Doppler spectra measurements of Arctic ice precipitation clouds (Mariko Oue)

11:30 - Enhanced Cloud Drizzle Separation from Doppler spectra: Application to ENA Observations (V. Chandrasekar)

11:45 - Evaluation of drizzle representation in LES models with bin microphysics (Jasmine Remillard)

12:00 - Diagnosing cloud radar miscalibration during CAP-MBL using higher order moments of the Doppler spectrum (Ed Luke)

12:15 – Discussion of needs, priorities, and future directions

Land-Atmosphere-Cloud-Interactions (Berg) [Ash Grove]

Session Description: The session will have two parts, one focused on the NSA and the other on the SGP. Two invited presentations will be given that will highlight recent results and discuss outstanding instrument needs at the NSA and SGP sites, respectively.

We would like to invite interested individuals to submit 1-2 slide "Flash Talks" to be presented at the session. These talks should be ultra-short (2-3 minutes) and provocative in their content. The flash talks, along with the invited presentations, will serve as fodder for discussions related to research and instrumentation needs as well as possible collaborations across the program.

Biomass burning aerosols: variability in absorption efficiency and radiative effects (Y. Feng and Sedlacek) [Potomac]

10:45 Welcome – uncertainties in large-scale modeling of BB aerosols (Yan Feng)

10:53 BB aerosols aloft and the low cloud responses (Paquita Zuidema)

11:00 Impacts of mixing state on BB aerosol optical properties (Nicole Riemer)

11:08 Formation and characteristics of strongly absorbing tar balls in BB (Art Sedlacek)

11:15 Chemistry and optical properties from biomass burning during BBOP (Tim Onasch)

11:22 Ground-based aerosol optical measurements of BB aerosols (Allison McComiskey)

11:30 Observations of vertical distribution of aerosols using Lidar (Rich Ferrare/Tyler Thorsen)

11:37 An update on LASIC (Amon Haruta/Stephen Springston)

11:45 5-minute summary of Absorbing Aerosol workshop with a focus on BB (Art Sedlacek)

11:50 – 12:45 Discussion Period

Guiding Breakout Discussion Questions:

- *What are the major uncertainties in modeling BB aerosol radiative effects?*
- *Where do we stand now in observations and what key observations are needed?*

<u>Thursday, 1:45 pm – 4:00 pm, Breakout Session 6</u>

Radar science & operations (Bharadwaj/Kollias) [Fairfax]

AMSG [Invitation only] (McComiskey/Sisterson) [Ash Grove]