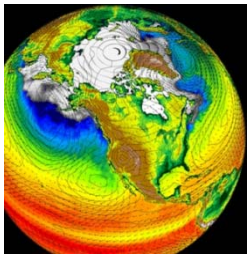
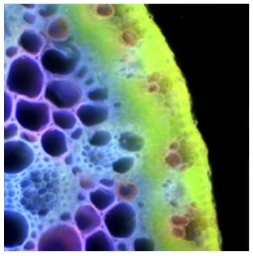
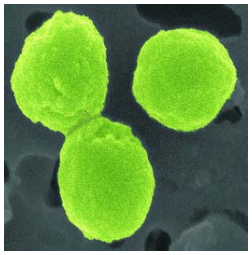


CESD Atmospheric Testbed Workshop

Summary Report for BERAC

Sally McFarlane (ASR)

with

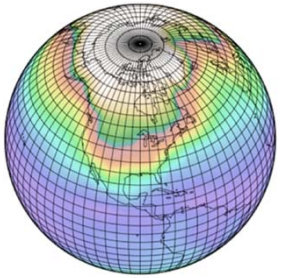
Dorothy Koch (ESM), Renu Joseph (RGCM), Wanda Ferrell (ARM), Ashley Williamson (ASR)

Outline

- Motivation
- Goals and agenda of workshop
- Testbeds under discussion
- Summary
- Actions recommended

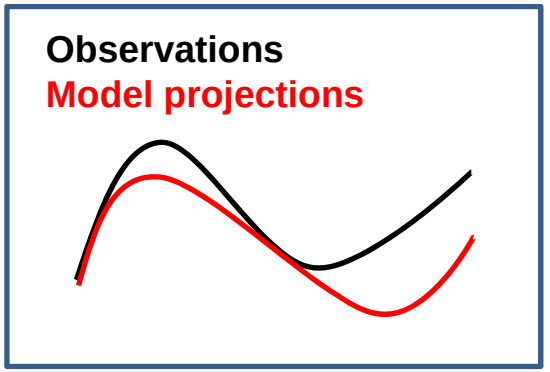
Motivation

- CESD strategic plan emphasizes the need to promote synergy and efficiencies involving data, testbeds, experiment, and modeling investments, that both simplifies the BER planning process as well as makes scientific research more efficient.



- Testbeds are systematic, automated frameworks that compare model simulations with observations to evaluate and identify sources of errors in model simulations of physical processes.

- CESD currently funds 4 atmospheric modeling testbeds
  - All are led by National Laboratories and use ARM as key data source
  - Each targets distinct model type or processes
- More testbeds are in the pipeline, e.g., NGEE



Workshop Goals

- Improve coordination and identify potential synergies of the CESD atmospheric testbeds
- Improve linkages between testbeds and the ARM facility
- Identify ways to improve utility of testbeds to the modeling community
- Identify gaps in testbed portfolio
- Develop a general architecture that efficiently incorporates future testbeds

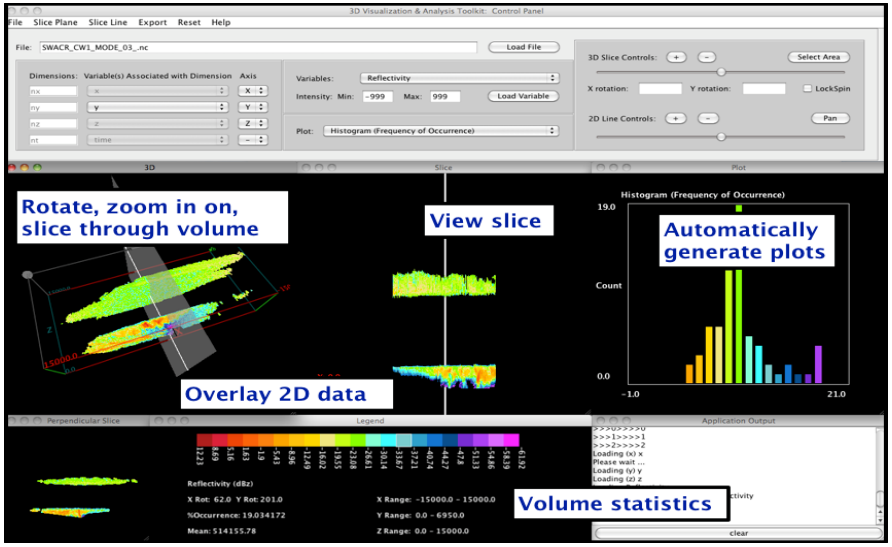
Venue/timing: August 5-6, 2013 at DOE, Germantown

Participation:

- BER program managers
- Representatives from each testbed
- ARM facility data product representatives
- Model users

Workshop Agenda

- Day 1 - Morning Session
  - Introductions and workshop charge
  - Four Testbed overview presentations
  - Two Invited presentations on global and process modeling needs
- Day 1 - Afternoon Session
  - Topical discussions:
    - Testbed overview discussion
    - Datasets
    - Visualization and analysis software
- Day 2 - Morning Session
  - Topical discussions:
    - Modeling Frameworks
    - Coordination Opportunities
- Day 2 – Afternoon Session
  - Identified workshop outcomes and action items



FASTER Visualization Toolkit

Workflow of a “standard” testbed…

Host Model:

- Cloud-resolving, regional, or global atmospheric model

Testbed Cases:

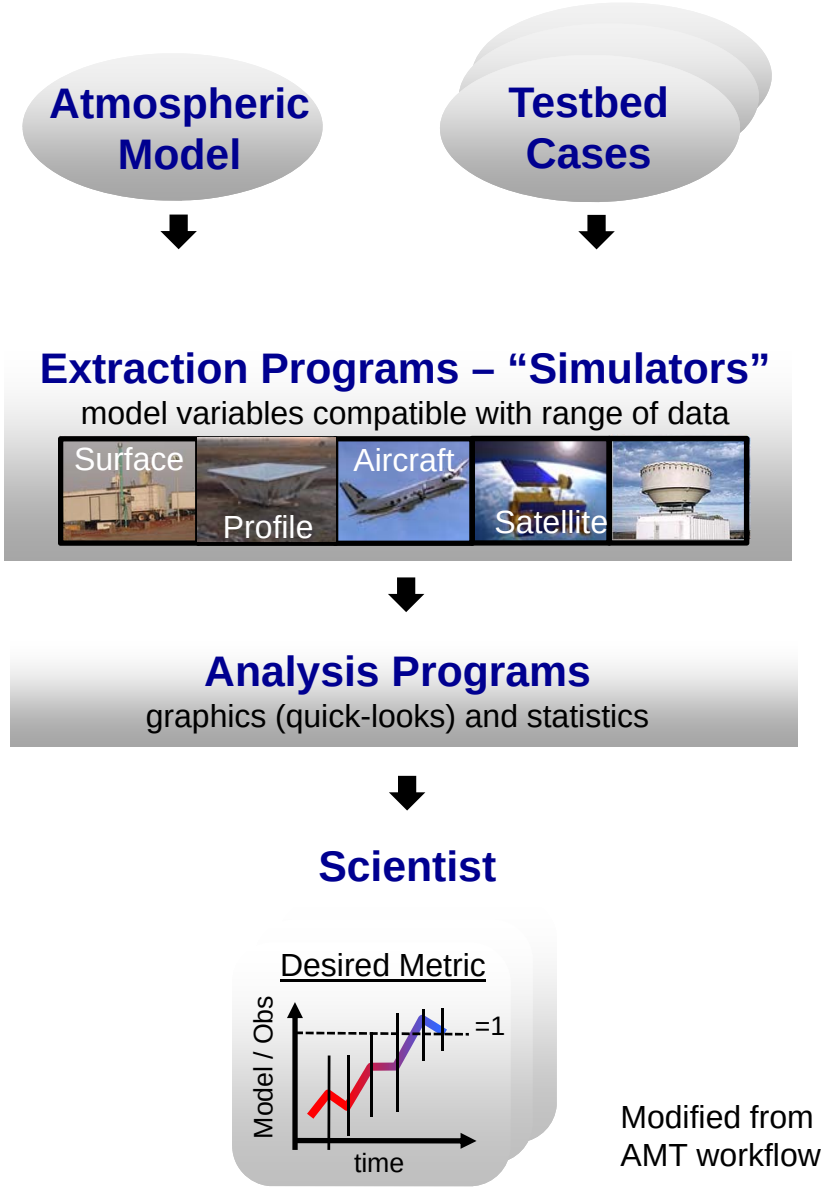
- Sets of field campaign observations targeting specific aerosol or cloud processes

Analysis Tools:

- Suite of tools that graphically and statistically compare a wide range of observed and simulated quantities

Science:

- Testbed results used to identify errors in particular process representations in the model and improve them



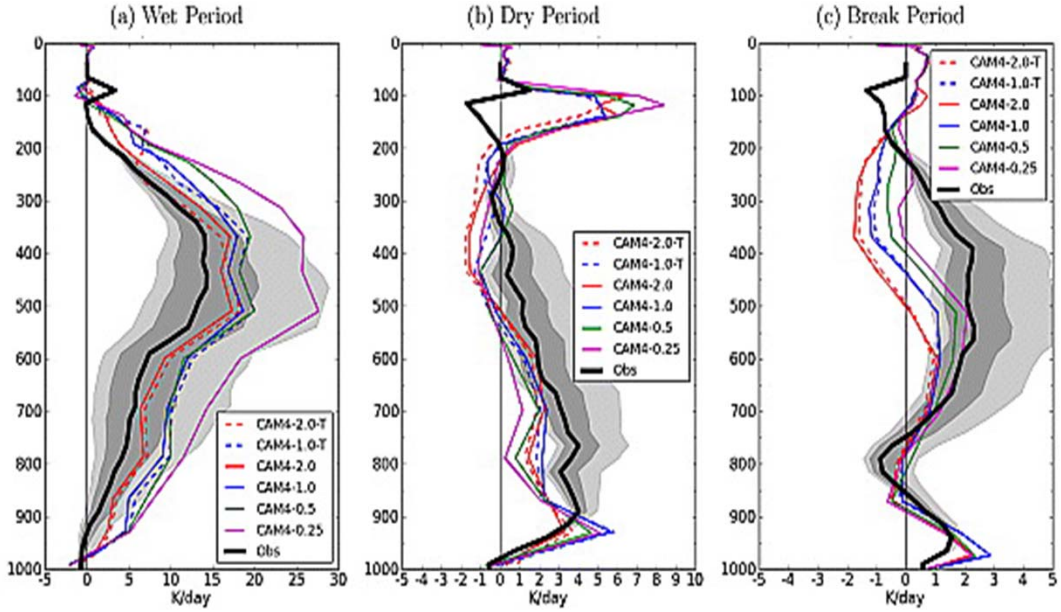
Modified from AMT workflow

The 4 atmospheric testbeds today

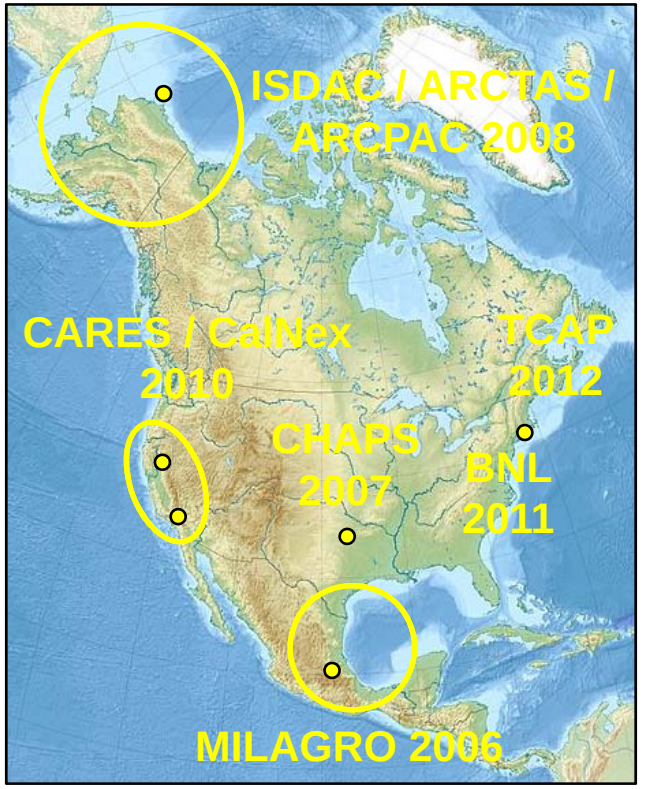
Testbed	Title	Lead lab	Description
AMT	Aerosol Modeling	PNNL (ASR SFA)	Regional model to test aerosol processes
FASTER	Fast-Physics	BNL (ESM 5-yr project)	Cloud processes and parameterizations, from LES to global scales
CAPT	Cloud-associated parameterizations	LLNL (RGCM/ASR SFA) & UCAR (RGCM)	Global model framework to test global cloud parameterizations in forecast mode
CSSEF	Climate Science for a Sustainable Energy Future	ESM Multi-lab (5-yr project)	Framework to test cloud parameterizations for a variable-mesh version of the CESM.

Example of discussion questions during Dataset session

- What are existing datasets, how are these formatted?
- What datasets are planned/needed?
- How might dataset distribution be better coordinated across DOE community?
- How might we improve coordination of ARM dataset development; coordination with ARM archive?



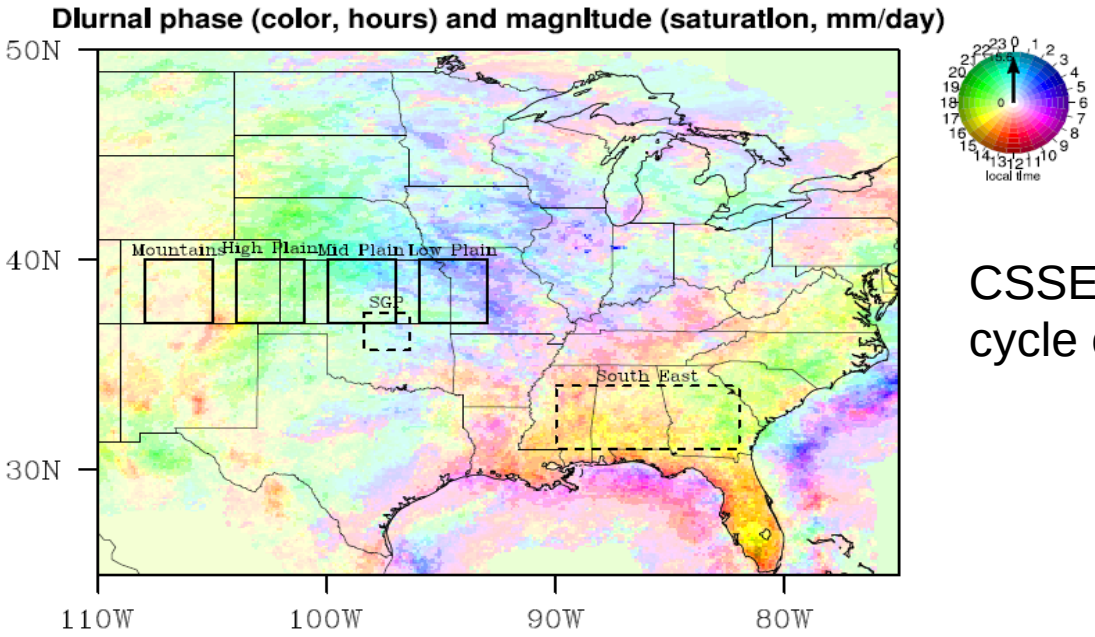
Locations of AMT datasets



Diabatic heating profiles derived from TWP-ICE observations compared to model simulations via CAPT

Example of discussion questions during Visualization & Analysis session

- What are the existing analysis/visualization capabilities?
- What are plans for further development of these?
- Might the current tools/technologies be shared among groups?
- What analysis is done, UQ, bias calculations, tuning, etc.?



CSSEF visualization of diurnal cycle of precipitation over the US

Workshop Summary

- Distinctions and commonalities were identified
  - Distinctions include model configurations (e.g., regionally refined) processes examined (e.g., aerosol chemistry) and techniques (e.g., uncertainty quantification)
- Areas for improved future coordination include:
  - Datasets and scripts for model initialization
  - Expansion of testbeds to study land-atmosphere interactions
  - Analysis of aerosol indirect effects
- Gaps/needs include:
  - Standard formatting of datasets; documentation; user-friendly websites and quick look plots; archives for model simulations
  - An ARM instrument simulator package
  - Data assimilation methods & continuous LES simulations to create high resolution reanalysis dataset over the ARM sites
  - Automation & availability to wider community

Post-workshop Actions – report and meetings

- Testbed leads and discussion leaders have provided contributions to a workshop report (in preparation)
- Testbed session scheduled at ASR Fall Working Group (WG) Meeting
  - Provide brief overview of each testbed to ASR WGs to promote use of and collaboration with testbeds
  - Identify needs of ASR community not currently being met
- Session on radar simulators scheduled at ASR WG Mtg
- Town Hall on CESD Testbeds scheduled at American Geophysical Union (AGU) in December
  - Publicize CESD testbeds to broader community
  - Solicit community input on atmospheric testbed interests and needs
- ARM/ASR/EU collaboration exploring idea of continuous LES simulations at ARM sites

Post-workshop actions: Enhance coordination

- ARM translators will link testbeds and ARM facility and will:
  - Discuss testbed data development activities and needs to ARM on Translator Conference calls
  - Facilitate movement of testbed datasets to ARM PI data archive
- Testbeds identified specific data/software to share among each other and with wider community
  - Datasets are currently being formatted and documented; will be hosted in ARM PI archive or ESGF

- Testbeds identified potential joint activities
  - Coordinated study of aerosol indirect effect (AMT, FASTER, CAPT)
  - Test case intercomparison activity from ARM field campaigns, e.g. GOAmazon, MAGIC
- Ongoing DOE discussion on how best to coordinate these activities and align with programmatic goals

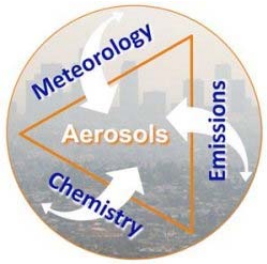
Testbed Attendees

Attendee	Institution	Testbed
Satoshi Endo	BNL	FASTER
Jerome Fast	PNNL	**AMT Lead**
Scott Giangrande	BNL	CSSEF
Bill Gustafson	PNNL	AMT
Mike Jensen	BNL	FASTER
Steve Klein	LLNL	**CSSEF and CAPT Lead**
Vince Larson	U. Wisconsin, Milwaukee	
Wuyin Lin	BNL	FASTER and CSSEF
Yangang Liu	BNL	**FASTER Lead**
Hsi-Yen Ma	LLNL	CAPT
Jim Mather	PNNL	ARM
Brian Medeiros	NCAR	CAPT
Phil Rasch	PNNL	
Laura Riihimaki	PNNL	CSSEF
Chitra Sivaraman	PNNL	ARM
Jimmy Voyles	PNNL	ARM
Dean Williams	LLNL	CSSEF
Shaocheng Xie	LLNL	CAPT
Yunyan Zhang	LLNL	CAPT

Testbed Websites for Further Information

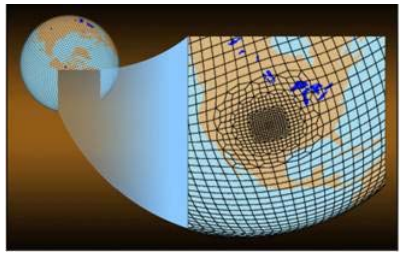
http://www.bnl.gov/faster/

http://www-pcmdi.llnl.gov/projects/capt/index.php



AMT

http://www.pnl.gov/atmospheric/research/aci/amt/index.stm



CSSEF

http://climate.llnl.gov/cssef/index.html