ARM

CLIMATE RESEARCH FACILITY

ARM Climate Research Facility Part III: New Datastreams and the ARM Web Site

First ASR Science Team Meeting
March 15, 2010

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Pacific Northwest National Laboratory

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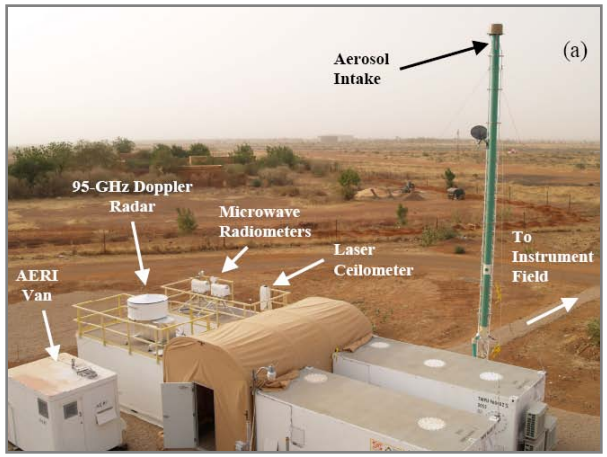
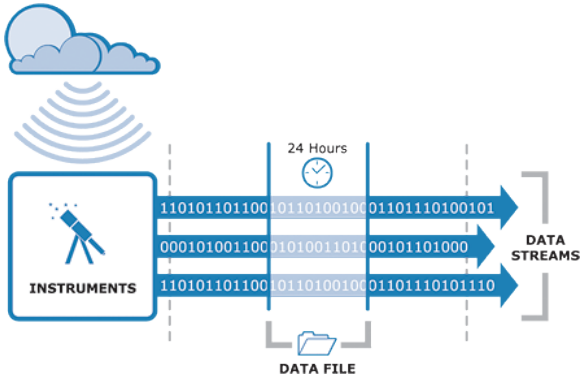
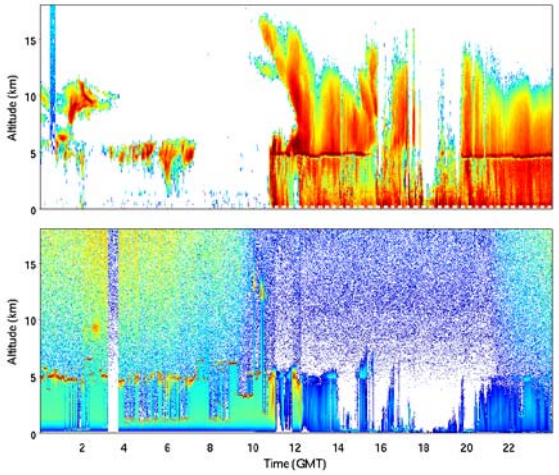
Facility Components: Data processing

- Research sites – permanent, mobile, and aerial
- Instruments and measurements
- Data processing, data quality, Data Archive
- Field campaigns – ground-based and airborne







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Standard Data Products

Standard procedure is to process or “ingest” raw data to NetCDF (Network Common Data Format):

http://www.unidata.ucar.edu/software/netcdf/

Tools available from IDL, Matlab, Fortran, C, Python, …

Processed Data levels:

- a0 – Direct from instrument to NetCDF format
- a1 – Processed to engineering units
- b1 – Includes basic quality checking (e.g. max/min)

Anatomy of a NetCDF Filename

sgpmplpolC1.b1.20091117.000002.cdf

- Site: sgp, twp, nsa, nim, hfe, …
- Datastream family: skyrad, mwrlos, mmcr, …
- Facility (sgp, C1 = central facility)
- Data level (a0, a1, b1, c1, s1)
- Date group (YYYYMMDD)
- Time group (HHMMSS)

Expanding Continuous Products

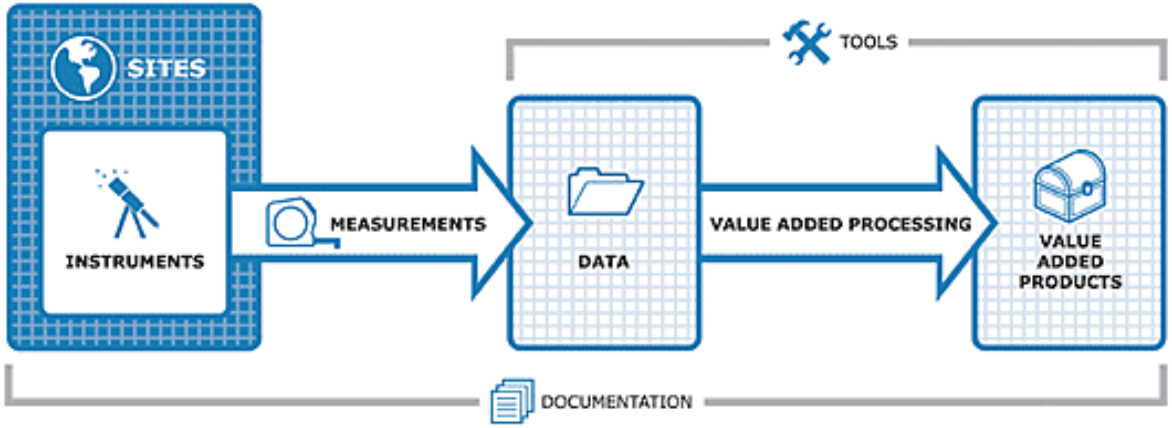
What if standard products aren't enough?

- Higher order data products
  - Value added products
  - Evaluation products
  - Principal Investigator (PI) products
- New instruments

Value Added Products

Value-Added Products (VAPs) provide additional information relative to basic ARM datastreams:

- Improved retrievals (physically based liquid water path)
- Higher order geophysical parameters (liquid water content, cloud classification, dynamical forcing)
- Data quality assessment
- Synthesis products (Cloud Modeling Best Estimate)



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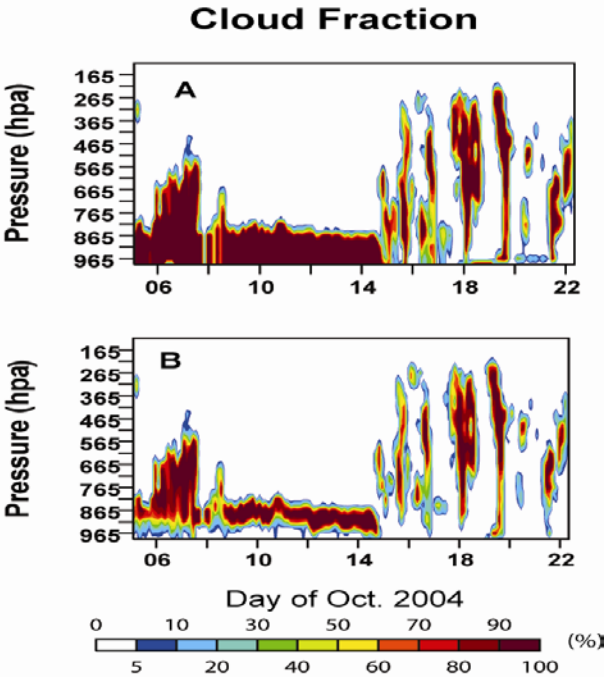
Value-Added Products - Example

Cloud Modeling Best Estimate (CMBE)

- Quantities that reflect unique ARM measurements on clouds and precipitation
- Input directly from ARM data files or derived from ARM observations
- Temporal resolution comparable with climate model output
- Standard deviations within 1-hour average period and qc flags for questionable data
- Covers primary ARM sites for existing data



Shaocheng Xie

Standard VAP Pathway

1. Promote peer-reviewed processing algorithm in working group (cloud lifecycle; aerosol life cycle; cloud, aerosol, precipitation interactions)
2. Recommended algorithm is submitted to Engineering Review Board (through Engineering Change Request)
3. PI, Developer, and Translator work to develop an ***Evaluation product***.
4. Evaluation product is reviewed
5. PI, Developer, and Translator complete development process to produce VAP which is then run as part of standard data processing.

PI Products

We also welcome submissions of data sets developed by investigators from peer-reviewed data processing algorithms.

Currently have 18 PI products including:

- Aerosol Retrievals from MFRSR data
- In situ microphysics from M-PACE
- Radiosonde RH corrections

Adding new instruments

Procedure for adding a new (existing) instruments is very similar to adding VAPs: develop recommendations within working groups.

ARM management develops acquisition plans based on recommendations and other factors such as feasibility.

Even with Recovery Act – it is important to articulate measurement needs.

Potential avenue for new technology is the SBIR (Small Business Innovation Research) process.

Key Contacts for new datastreams and instruments

Working Group Chairs

- Cloud lifecycle: Matthew Shupe, Anthony Del Genio
- Aerosol lifecycle: Allison McComiskey, Jian Wang
- CAPI: Dave Turner, Steve Ghan

Translators

- Observation: Mike Jensen, Connor Flynn, Sally McFarlane
- Modeling: Shaocheng Xie, Jerome Fast

Information Center: www.arm.gov

Extra Slides

Proposing New Data Streams

ARM Program Managers
Wanda Ferrell
Rick Petty

ASR Program Managers
Kiran Alapaty
Ashley Williamson

Infrastructure Management Board (IMB)
Wanda Ferrell, Rick Petty,
Jim Mather, Beat Schmid, Jimmy Voyles,
Doug Sisterson, Raymond McCord

Working Group Chairs
Ann Fridlind, Allison McComisky,
Matt Shupe, Dave Turner

Science and Infrastructure Steering Committee (SISC)

ARM Translators
Connor Flynn, Mike Jensen,
Sally McFarlane, Dave Turner,
Shaocheng Xie

Infrastructure

Focus Groups

Science Team/
Working Groups

Overview: Measurements and Instruments

- Cloud profiles: millimeter radar and lidar
- Temperature/relative humidity /wind profiles: radiosondes
- Column water: microwave radiometer
- Column aerosol: solar spectral radiometer
- Surface radiation budget: solar and terrestrial IR radiometers
- Surface meteorology: T/RH/wind

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conduct field campaigns to augment routine data acquisitions and to test and validate new instruments.
Announcements
Feb 2, 2011 The deadline for preproposals has been extended to Tuesday, February 16. Successful candidates for proposed major campaigns using ARM fixed, mobile, or aerial facilities will be eligible for up to $150K per year for three years of research funding from Atmospheric System Research. Full proposals, due May 1, must include an additional section on the research associated with the campaign to be considered by the Science Board for the funding. Submit your preproposal now.
1. First, review the guidelines for submitting proposals.
2. Next, submit a preproposal; a short summary of the proposed campaign.
3. Wait for a response from the Infrastructure Management Board (IMB) and/or ARM Science Board.
4. A full proposal or science plan, may be requested.
5. Decision is made—now what is expected?
AMF Proposal Schedule and Availability
» AMF 2 available Oct 1, 2011
» AMF 1 available Jun 1, 2012
» Preproposals due Feb 16
» Invited full proposals due May 1
BEGIN PROPOSAL
CARES
Carbonaceous Aerosol and Radiative Effects Study
SPARTICUS
Small Particles in Cirrus
RHUBC-II
Chile: Radiative Heating in Underexplored Bands Campaign 2
CAP-MBL
Azores: Clouds, Aerosol and Precipitation in the Marine Boundary Layer
RACORO
Routine AAF CLOWD Optical Radiative Observations
[View All]
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Keyword Search
[List of Campaigns]
ALL
SGP
NSA
TWP
AMF
AAF
Other
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ARM.gov » Measurements

Measurements

The ARM Climate Research Facility gathers a wide variety of measurements from many different sources. Each day, the Data Archive stores and distributes large quantities of data collected from these sources. Scientists then use these data to research atmospheric radiation balance and cloud feedback processes, which are critical elements of global climate change.

Measurement	Categories	Sub Categories
Advective tendency	» Atmospheric State	» upper air state
Aerosol absorption	» Aerosols	» optical and radiative properties
Aerosol concentration	» Aerosols	» microphysical and chemical properties
Aerosol extinction	» Aerosols	» optical and radiative properties
Aerosol optical depth	» Aerosols	» optical and radiative properties
Aerosol optical properties	» Aerosols	» optical and radiative properties
Aerosol particle size	» Aerosols	» microphysical and chemical properties
Aerosol scattering	» Aerosols	» optical and radiative properties
Atmospheric moisture	» Atmospheric State	» surface meteorology » upper air state
Atmospheric pressure	» Atmospheric	» surface meteorology

Measurement Categories

Select below to highlight measurements in specified measurement categories.

☑ **Aerosols**

The effect of aerosols is measured by instrument systems and lidars that provide data on the size distribution, optical properties, scattering, and extinction of aerosols.

- ☑ microphysical and chemical properties
- ☑ optical and radiative properties

☑ **Atmospheric State**

- ☑ other trace gases
- ☑ surface meteorology
- ☑ upper air state

☑ **Cloud Properties**

Atmospheric System Research

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The U.S. Department of Energy's Atmospheric System Research is an observation-based research program created in October 2009 to advance process-level understanding of the key interactions among aerosols, clouds, precipitation, radiation, dynamics, and thermodynamics, with the ultimate goal of reducing the uncertainty in global and regional climate simulations and projections.

Funding announcement for the Atmospheric System Research (ASR) program

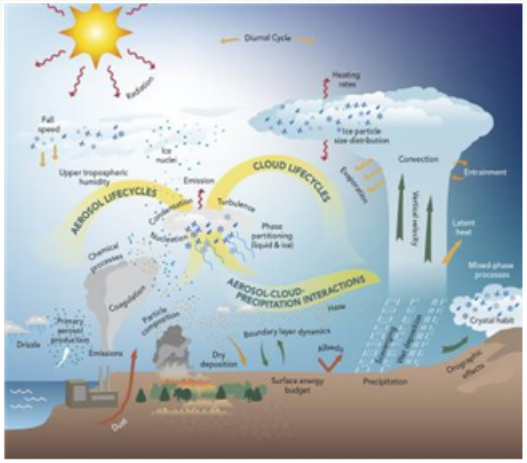
The Office of Biological and Environmental Research within the U.S. Department of Energy's Office of Science has posted the first Atmospheric System Research (ASR) Funding Opportunity Announcement (FOA) to develop innovative laboratory and observational data analyses and to utilize the resulting knowledge from such analyses to improve cloud and aerosol formulations in global climate models. The Funding Opportunity Announcement is available on the Office of Science website.

Applications are due by 4:30 p.m. EST on April 12, 2010.

Pre-applications should consist of a PDF file containing a maximum of two pages of narrative describing the research objectives, the technical approach(s), and the proposed team members and their expertise. Applicants for collaborative projects should submit a single pre-application identifying all project participants. Pre-applications should be sent via e-mail to both the program managers, Drs. Kiran Alapaty and Ashley Williamson. Please include "Lead PI name – Preapplication -- DE-FOA-0000291 [Full or Exploratory]" in the subject line of the e-mail.

ASR science plan

The *Atmospheric System Research (ASR) science and program plan* is available.



A multitude of dynamic processes comprise the atmospheric system. (Enlarge for the fully labeled version)

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