Recovery Act Contributions to ARM Infrastructure and ASR Science and Broadening Contributions through Field Campaigns

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Presentation Outline

- Recovery Act Overview
- Collaborating through Field Campaigns
- Contacts and Information
Recovery Act: Introduction

- $60M from DOE Office of Science for investments in instrumentation and research infrastructure
- 3-dimensional measurements of cloud scale dynamics, microphysics, and precipitation
- Enhanced measurements of atmospheric aerosol composition and chemistry
- Enhanced measurements of cloud composition
- Enhance measurement base to bridge new knowledge into, and improve, the predictive performance of climate models

www.arm.gov/about/recovery-act
Recovery Act

Contributing to ARM Infrastructure and ASR Research

[Images of ARM infrastructure and research equipment]
Recovery Act: Instrumentation and Measurements

Scanning Precipitation Radars

Scanning Dual Frequency Cloud Radars

Raman, High Spectral Resolution, and Doppler Lidar

3-dimensional precipitation patterns

Microphysical structure of clouds

Cloud and aerosol properties, updraft velocities, water vapor
Recovery Act: Instrumentation and Measurements

- 3-Channel Microwave Radiometers
- Infrared and Solar Spectrometers
- Expanded Surface Flux Network

- Precipitable water vapor and liquid water path
- Infrared and solar radiation, water vapor, and aerosols
- Water vapor fluxes, latent and sensible heat, carbon dioxide
Recovery Act: Instrumentation, Measurements, and Infrastructure

Atmospheric Aerosols, Chemistry and Cloud Composition

Mobile Aerosols

Size distribution, concentration, composition, and chemistry

Research Site Infrastructure

Mobile Facilities

Tropical Western Pacific

North Slope of Alaska

Southern Great Plains

Mobile Facilities

New instrumentation siting and operational upgrades

Mobile Aerosols

Aircraft

Mobile Aerosols

Aircraft
Extensive Upgrades to Computing and Network Capacity

- Research Sites
- Data Management Facility
- Archive
- Network
- Storage
Resulting New or Revised Data Streams

- **Collection, Ingest, and Delivery**

  There are approximately 50 different instruments being introduced with a range of requirements.
Integrated Software Development Environment

- Environment hosted at the ARM Archive
- To provide an improved user experience for scientist
- Standardized retrieval, translation, and storage
- Community approach to code development
- Framework to analyze and process large data sets
- Capability for external code integration
Progress and Where We Are

- 100% of baseline instruments and contracts are placed
- 30% of the baseline instruments have been received
- All tasks are on track
Recovery Act - Closing Points

- Contact Jimmy Voyles at jimmy.voyles@pnl.gov
- Stop by our poster
- Visit the Recovery Act website for a complete summary of instruments and progress

www.arm.gov/about/recovery-act
Enhancing Interactions– When Standard ARM Data may not be Enough
Field campaigns provide the opportunity to augment observations at fixed sites or extend measurements to undersampled regions.
Field Campaign Capabilities: Fixed Sites

Southern Great Plains

Tropical Western Pacific

North Slope of Alaska

May through June 2011
Mid Latitude Continental Convective Clouds Experiment (MC3E)

October 2011 through March 2012
Observations of the Madden Julian Oscillation for Modeling Studies - AMIE (ACRF MJO Investigation Experiment)
Field Campaign Capabilities: ARM Mobile Facility 1

- “Portable site” obtains data from under-explored climate regimes
- Instruments, operations shelters, data systems, and on-site technicians
  - Since 2005, deployed to California, Africa, Germany, and China
  - Currently in the Azores for the Cloud, Aerosol, and Precipitation in the Marine Boundary Layer (CAP-MBL) campaign; May 2009 – December 2010
Field Campaign Capabilities: ARM Mobile Facility 2

- Increased modularity and robustness to accommodate space restrictions and marine environments
- New instruments to measure
  - Bulk aerodynamic fluxes
  - Ocean meteorology
  - Sea state and surface currents
- Storm Peak Laboratory Validation Experiment (STORMVEX) in Colorado; October 2010 – April 2011
Field Campaign Capabilities: ARM Aerial Facility

- In situ measurements for ground-based and satellite data validation
  - Small Particles in Cirrus (SPARTICUS) over the SGP site; December 2009 – April 2010
  - Carbonaceous Aerosol and Radiative Effects Study (CARES) in California; June/July 2010.
Field Campaign Capabilities: Combined AMF/AAF Campaign

- Ganges Valley Aerosol Experiment (GVAX) in India; April 2011 – March 2012
  - Combined AMF/AAF campaign
  - Will deploy the DOE G-1 aircraft
  - Researchers studying the impact of increasing aerosols on the Indian Summer Monsoon, specifically the impact on precipitation
  - In-country collaborators will provide complementary measurements
Field Campaign Capabilities: Mobile Assets

- Baseline instrument systems available for offsite deployments
  - Radiative Heating in Underexplored Bands Campaign 2 (RHUBC-II) in the Chilean Atacama desert; August – October 2009
  - ALTOS – Cloud properties measured from a tethered balloon near Oliktok, Alaska; October/November 2010
- Mobile Aerosol Observing System under development
Field Campaign Capabilities: Mobile Aerosol Observing System

- Instruments for collecting atmospheric measurements
  - Aerosol lifecycle (condensation particle counters, dual-column cloud condensation nuclei counter, nephelometer)
  - Atmospheric state (radar wind profiler, sodar system, weather transmitter)
  - Gases (trace gas instrument system, aerosol chemistry speciation monitor)
While there is an emphasis in large fixed Research Site, AMF, and AAF campaigns, many additional campaigns are supported.

- SGP Cloud Tomography Experiment
- Airborne carbon measurements
- Various visiting instruments for tests or calibration
Annual Field Campaign Proposal Cycle

- Announcement – Call for Pre-Proposals; December for FY(n+2)
- Pre-Proposals due February for Review
- Invitation for Full Proposal; Mid-February
- Full Proposals Due; May for infrastructure review and logistical analysis
- Science Board Review
- Awards announced in September
Visit the Field Campaign Webpage

http://www.arm.gov/campaigns

- Components of the Facility
  - Mobile Facilities (AMF1, AMF2)
  - ARM Aerial Facility
  - Mobile Aerosol Observing System

- Announcement Information:
  BAMS, EOS, EGU, or at www.arm.gov

  - Small proposals always welcome (e.g., guest instruments)
ARM Climate Research Facility
Contacts and Information

- Provide feedback regarding instruments, data, etc. (www.arm.gov/about/contact)

- Contacts:
  - Jim Mather, Technical Director – jim.mather@pnl.gov
  - Jimmy Voyles, Instrument and Field Campaign Coordinator – jimmy.voyles@pnl.gov

Visit the ARM website: www.arm.gov
Or follow us on Facebook (Facebook icon from the ARM homepage)
Thank You !
Progress and Where We Are

- 93% of the project costs are committed
- 22% of the project is costed
- Target 85% of project costed by FY2010 end
- Project completion by January 1, 2011
Field Campaigns

- Focused short-term research activities targeted to address specific science questions
- Provides supplemental measurements to increase routine data and test and validate new instruments
- Provides extensive field data to be analyzed and applied to improve computer models
Other Ways to Get Involved

- Download data (archive.arm.gov)
- Provide feedback regarding instruments, data, etc.
  (www.arm.gov/about/contact)

ARM Contacts:
- Jim Mather, Technical Director – jim.mather@pnl.gov
- Jimmy Voyles, Instrument and Field Campaign Coordinator – jimmy.voyles@pnl.gov
- Raymond McCord, Data Archive – mccordra@ornl.gov

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