



The ARM Climate Research Facility: Operations

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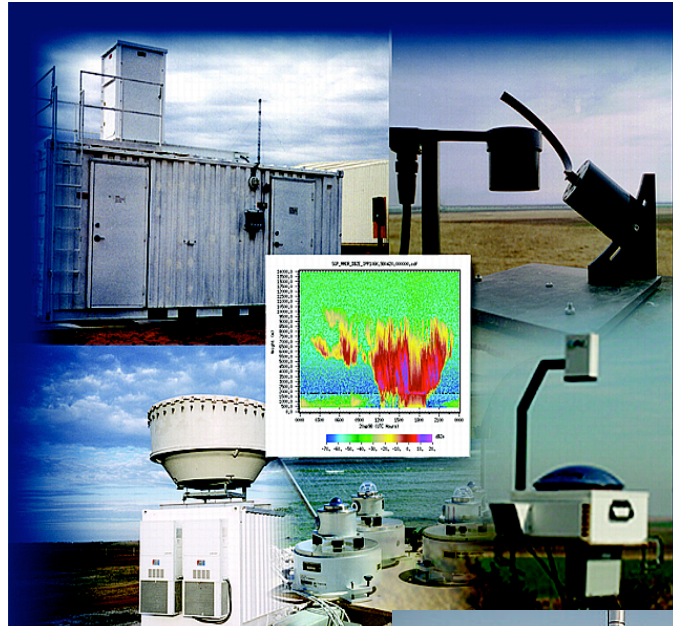
ARM Sites Report, 2011



U.S. DEPARTMENT OF
ENERGY

Office of
Science

Overview of ARM Sites and Facilities



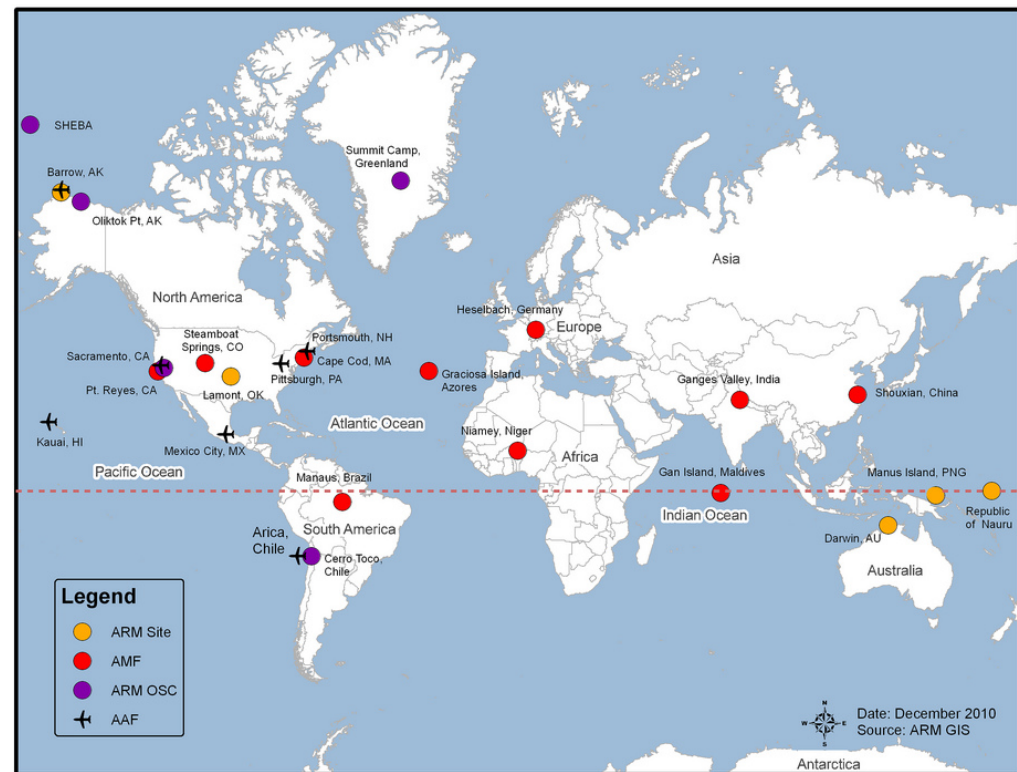
Capabilities and Deployment Locations

5 Fixed Sites in three vastly different climatic regions

2 mobile facilities that can be deployed worldwide

Aircraft platforms for in-situ observations

Off-site deployment capabilities that do not require a full complement of ARM instrumentation



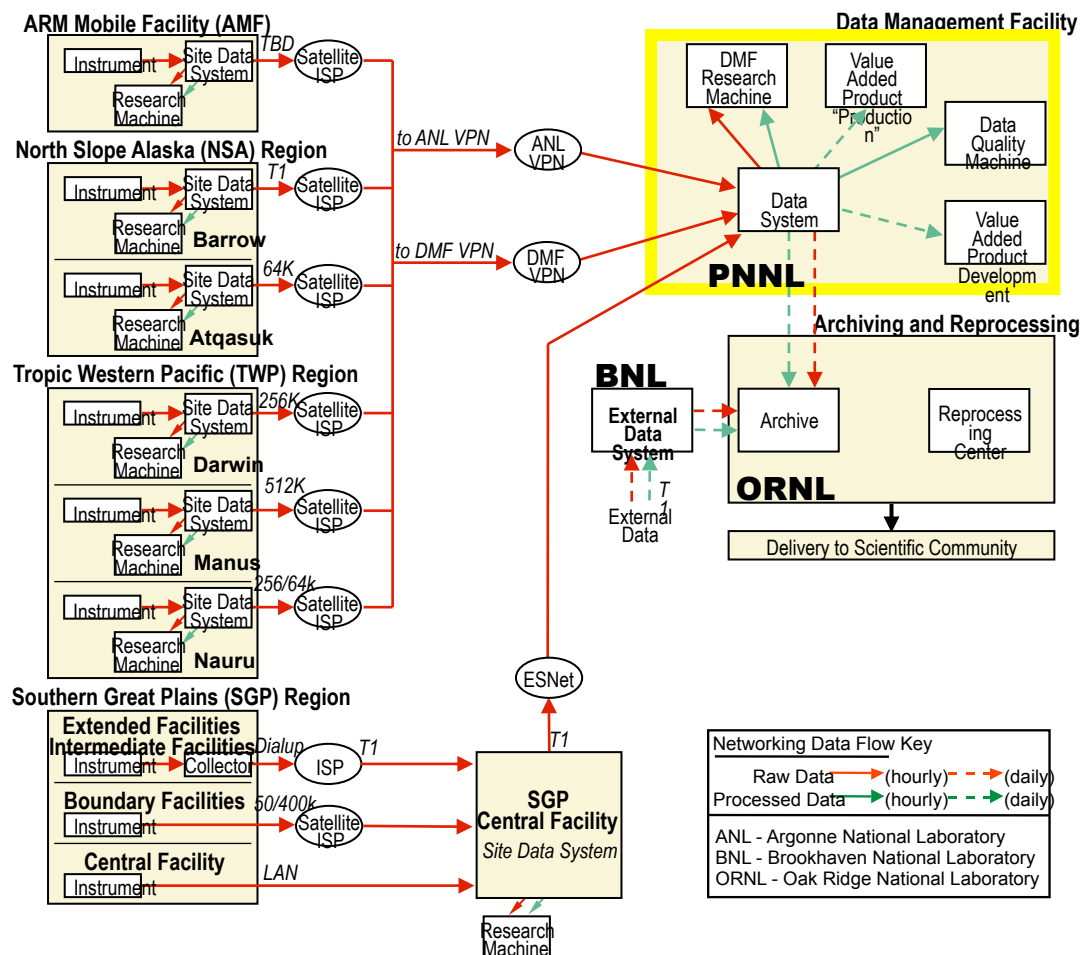
Data Pipeline

None of the ACRF facilities are located at a national Laboratory.

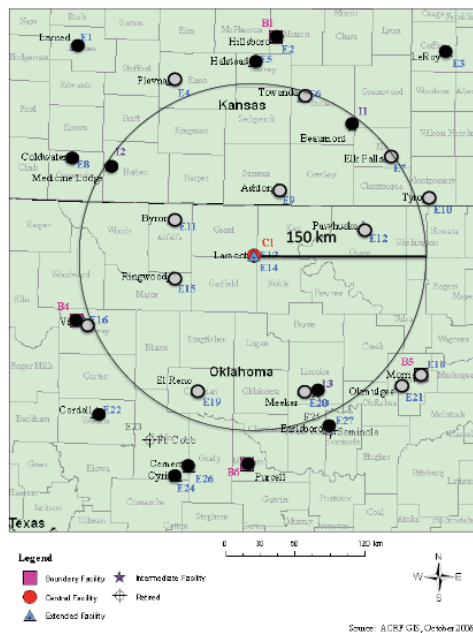
The ACRF is a facility without walls: the great outdoors is our experimental environment.

The ACRF provides the infrastructure to enable experiments to be conducted virtually.

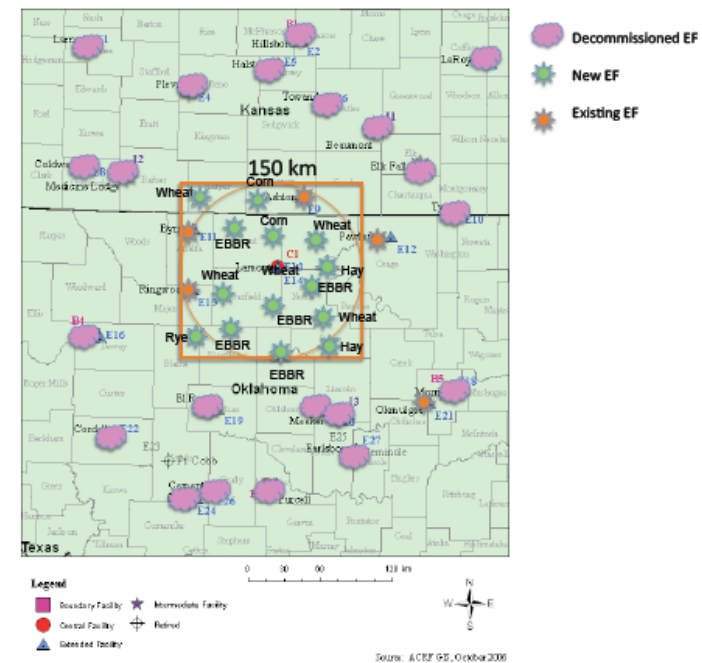
The Internet is our dataflow pipeline, connecting instrument data streams to users.



Southern Great Plains



In an ARM requested modeling study performed by Shaocheng Xie, it was shown that reduction of sites for the SGP domain did not result in an increase of uncertainty in boundary layer parameters.



The ARRA funds are being used to add surface flux instrumentation that more than doubles the density of sites in the smaller SGP domain.

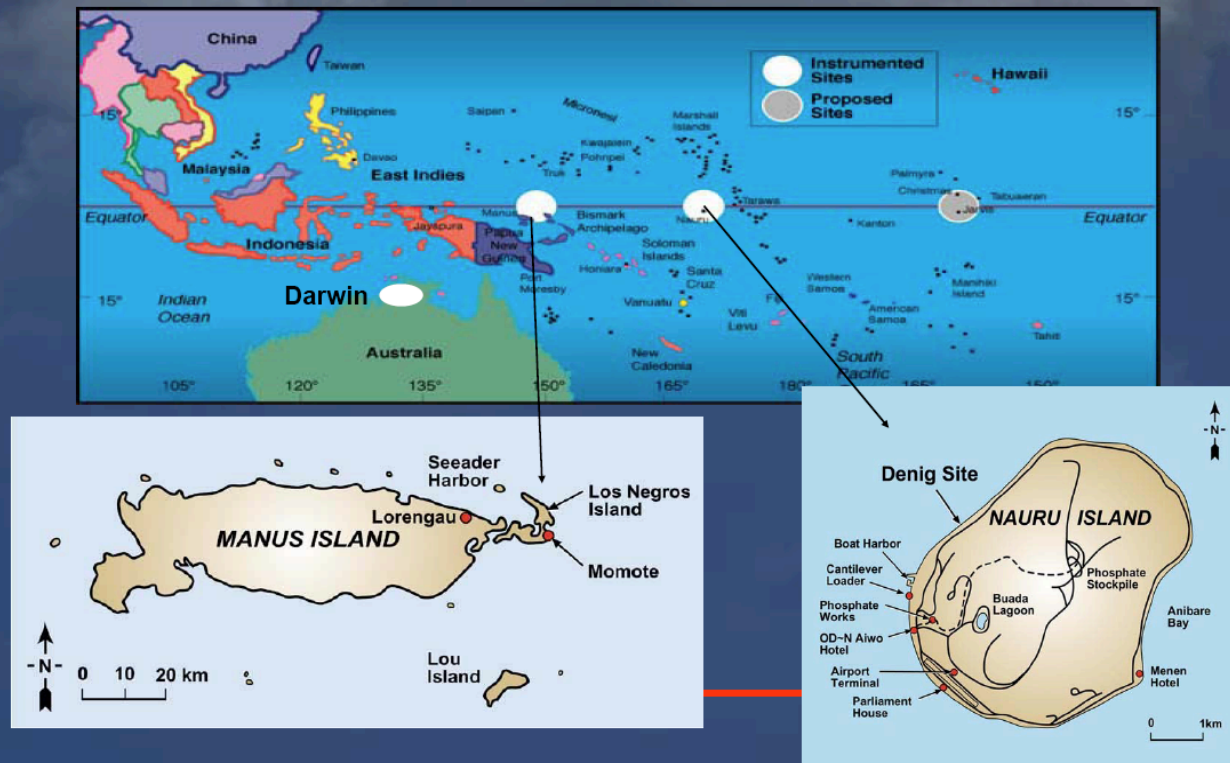
Southern Great Plains: Central Facility



Central Facility (1992)

Tropical Western Pacific

Tropical Western Pacific



Tropical Western Pacific



Darwin
(2003)



Manus
(1996)



Nauru (1998)

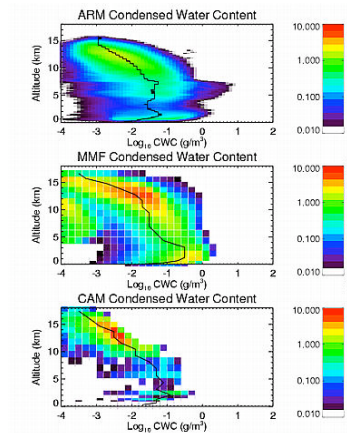
North Slope of Alaska



The New ARRA Capabilities

The **American Recovery and Reinvestment Act** of 2009 provided **\$60M** to the facility for instrumentation that will be fully operational by the end of 2011. This enhanced instrumentation suite will provide **unparalleled research capabilities**.

These **new measurements** will greatly expand the set of scientific **questions** in climate change research that can be supported and **reduce the uncertainty of the roles of clouds and aerosols in climate models**.



Recovery Act Impact at ARM Sites

- \$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 absorption, scattering, composition and chemistry
 - cloud composition
- Use new knowledge to improve the predictive performance of climate change models
- Over 120 individual procurement actions and 50 datastreams



Principal Measurement Groups and Supporting Infrastructure

- Scanning Precipitation Radars
- Reference Rain Network
- Scanning Dual-Frequency Cloud Radars
- Lidars for Clouds and Aerosols
- Multi-frequency Microwave Radiometers
- Infrared and Solar Spectroradiometers
- Expanded Surface Flux Network
- Atmospheric Aerosols and Chemistry
- Atmospheric State
- Aircraft Instruments and enhancements
- Research Site Infrastructure, Computing, and Networking upgrades



Recovery Act Impact at ARM Sites

A complete instrument and location list, progress highlights, and photos are located at this URL:

www.arm.gov/about/recovery-act





Recovery Act Impact at ARM Sites

X-Band Precipitation	●
C-Band Precipitation	●
Ka-X Band Cloud	●
Ka-W Band Cloud	●
MMCR Upgrades	●



SGP	● ● ● ●
NSA	● ● ● ●
TWP-D	● ● ● ●
TWP-M	● ● ● ●
AMF2	● ● ● ●
AMF1	● ● ● ●

Radars



Recovery Act Impact at ARM Sites

HSRL	●
Raman	●
Doppler	●
MPL	●
MPL Upgrades	●
Ceilometer	●



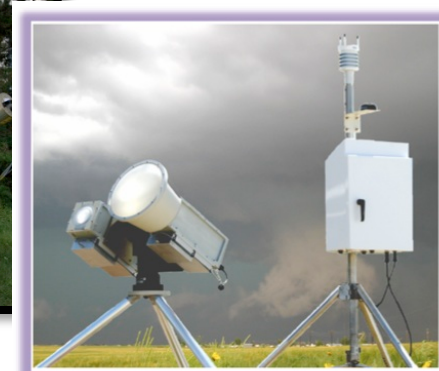
SGP	●	●	●	●
NSA	●		●	●
TWP-D	●	●	●	●
TWP-M			●	●
AMF2	●		●	●
AMF1		●	●	●

Lidars



Recovery Act Impact at ARM Sites

Sunphotometer	●
AERI	●
AERI-ER	●
MWR3C	●
SAS	●



SGP	●	●	●	
NSA	●	●		
TWP-D	●	●	●	
TWP-M	●	●	●	
AMF2	●		●	
AMF1	●	●	●	●

Radiometry



Recovery Act Impact at ARM Sites

ECOR/SEBS	●
RWP	●
Sonde	●
SODAR	●
RBL	●
PWS	●
Precipitation	●

SGP	●	●	●
NSA	●	●	●
TWP-D	●	●	●
TWP-M		●	●
AMF2			●
AMF1		●	
MAOS-A	●	●	



Meteorology

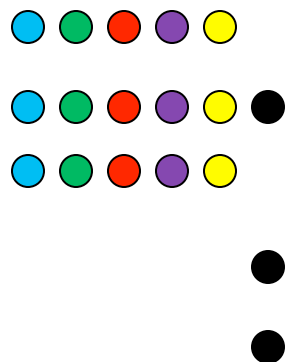


Recovery Act Impact at ARM Sites

Absorption
Scattering
Composition
Concentration
Size Distribution
Chemistry



AMF2 AOS
TWP-D AOS
MAOS-A
MAOS-C
SGP AOS



Aerosol Observations

Research Site Infrastructure Changes for FY 12

Mobile Facilities



Tropical Western Pacific



North Slope of Alaska



Southern Great Plains



New Flat Operations Management Team Structure:

NSA: Mark Ivey

SGP: Doug Sisterson

TWP: Larry Jones

AMF1: Kim Nitschke

AMF2: Brad Orr

ARM Climate Research Facility

A DOE/BER National User Facility for Climate
Observations for Climate Research

WWW.ARM.GOV

