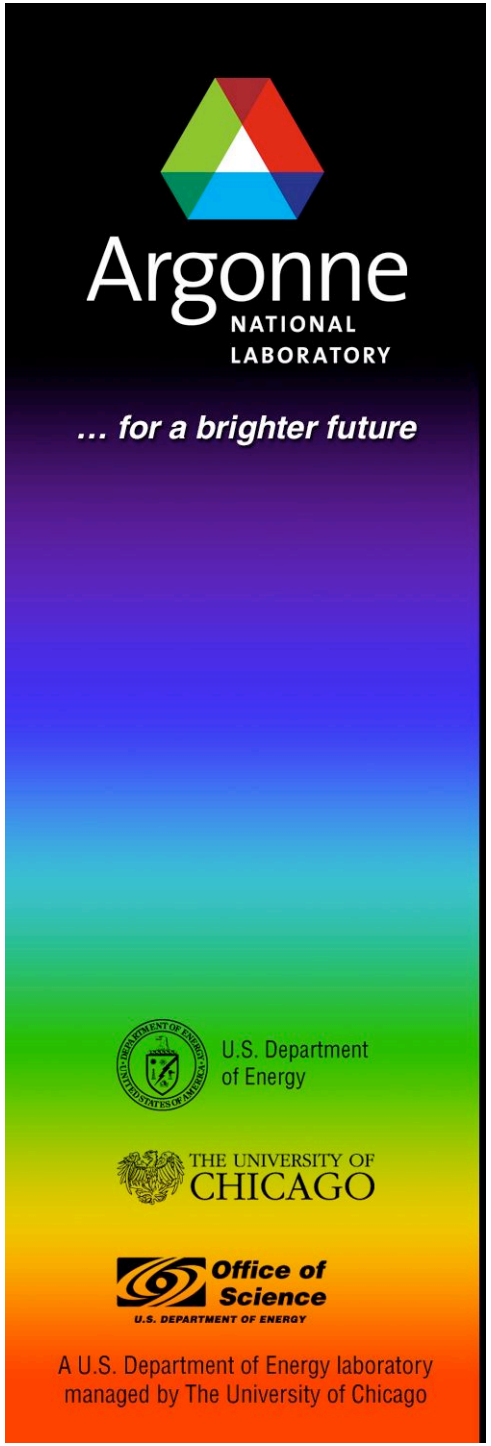


ACRF Fixed and Mobile Sites

Douglas Sisterson

ACRF Operations Manager

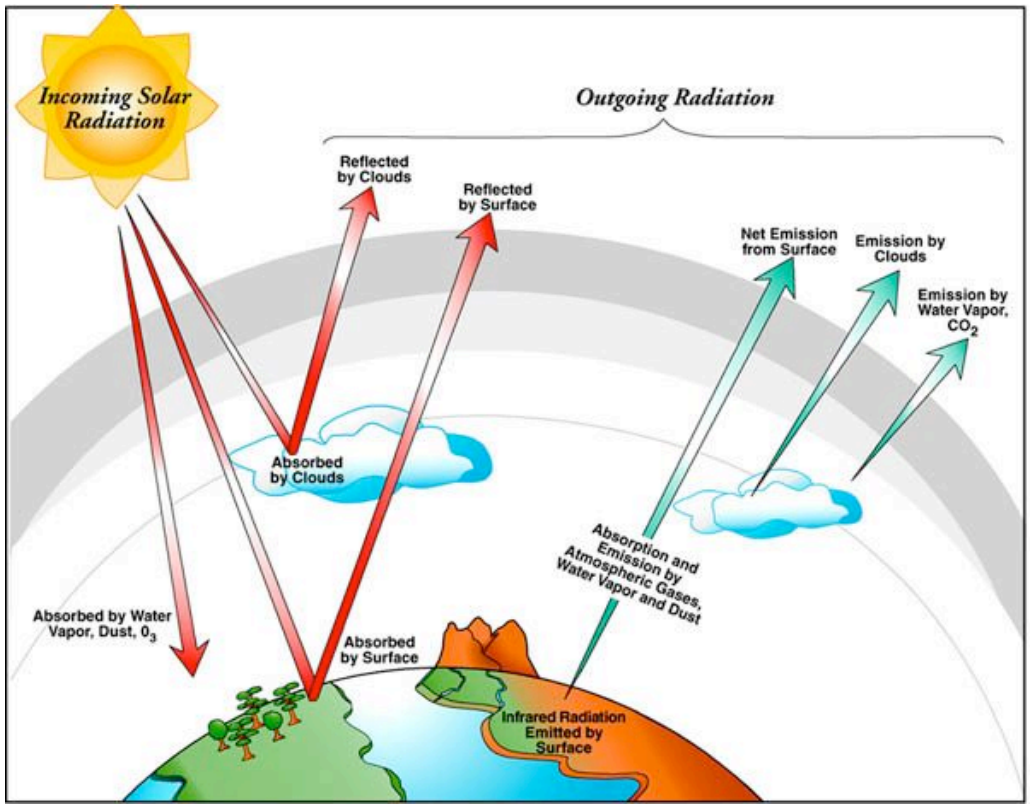
Decision and Information Sciences Division

Argonne National Laboratory

Meeting on the Implementation of the GCOS Reference Upper Air Network (GRUAN)

Overview of the US DOE Atmospheric Radiation Measurement (ARM) Climate Research Facility (ARCF)

A national user facility for the Office of Science,
Office of Biological and Environmental Research



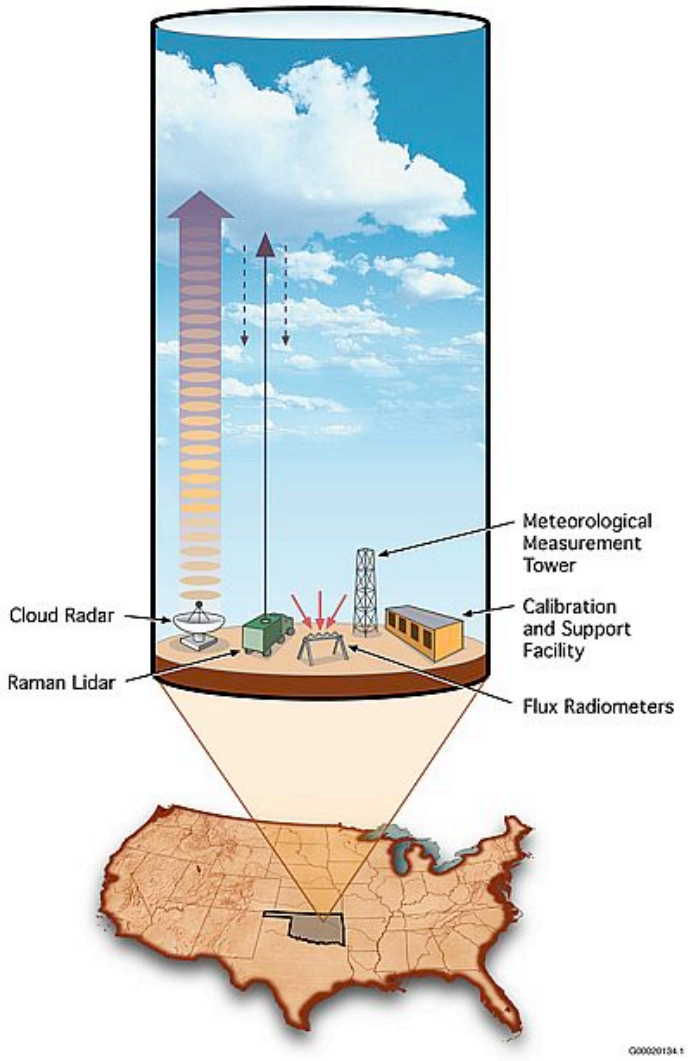
ARM Science Objective

Improve global climate models by developing and testing improved representation of cloud and radiative processes

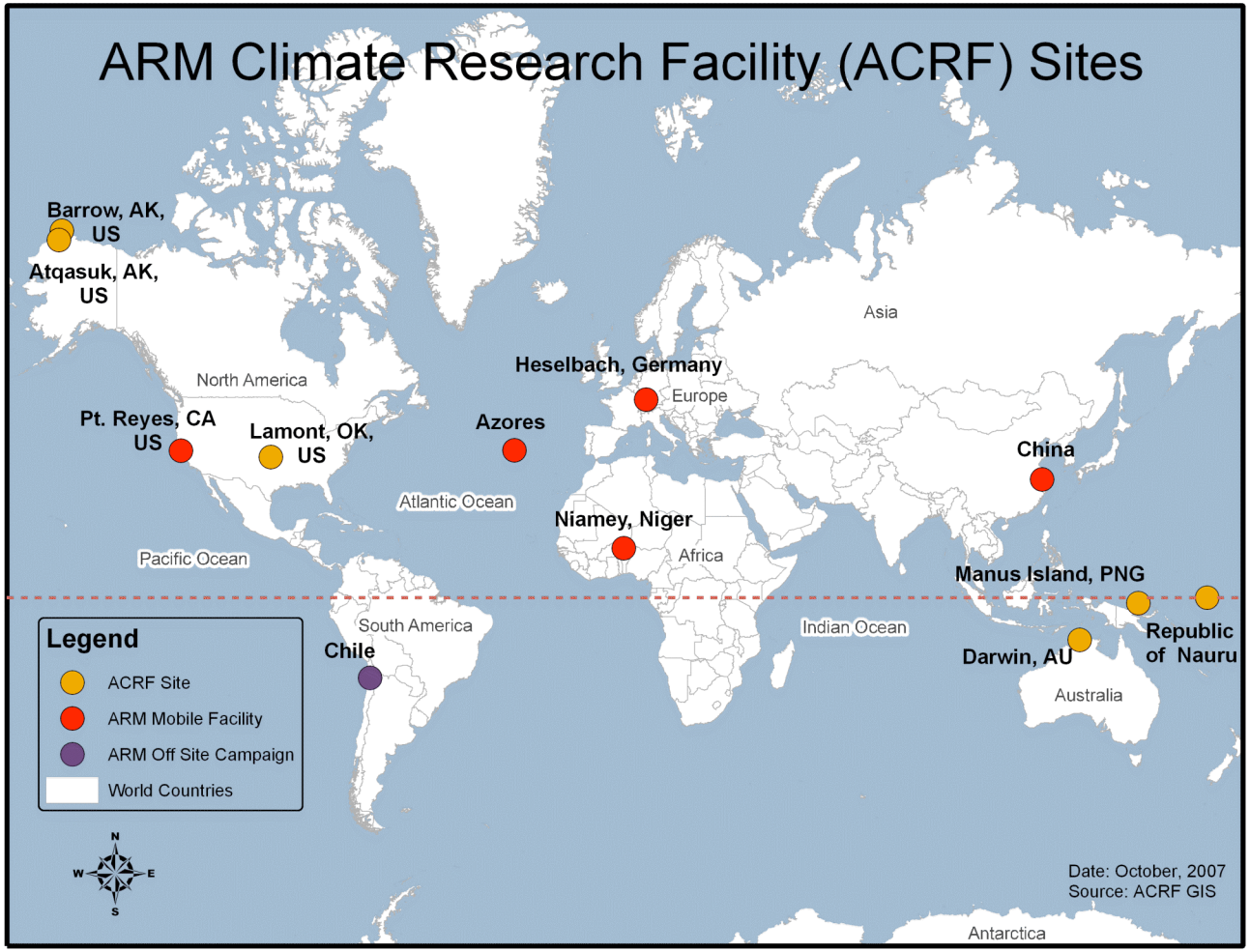
Objectives
ACRF National User Facility Mission Summary

- Provide the national and international scientific community with the infrastructure needed for scientific research on global change

- Global change research includes the study of alterations to climate, land productivity, oceans, water cycle, atmospheric chemistry, and ecological systems



ACRF Fixed Site and Mobile Facility Deployment Locations



ACRF Site Selection Considerations

- climatic significance
- climatic sampling
- potential for synergism with other programs
- scientific viability
- logistical viability

The first three criteria will determine the desirability of a potential ARM site with regard to its ability to address the scientific objectives of the program.

The fourth and fifth criteria determine the practicality of conducting the ARM experiment at a particular site.

ACRF Site Selection Considerations

Climatic Significance

A site may be considered climatically significant if it possesses radiatively important characteristics, is geographically prevalent, or experiences a wide range of weather and climate conditions.

ACRF Site Selection Considerations

Climate Sampling

- As has been described, the experimental characterization of a wide variety of climate conditions is crucial to the success of the ARM Initiative. Therefore, multiple sites will be necessary.

- The primary criterion for choosing the suite of sites is to gain a representative sampling of the range of climate conditions.

- The apparent qualities of a site:
  - topography and surface cover
  - characteristics of cloud type, distribution, and migration
  - rainfall patterns
  - aerosol loading
  - wetness or dryness (the ratio of latent to sensible heat)

ACRF Site Selection Considerations

Synergism with other Programs

- A degree of flexibility with regard to the siting of the ACRF experiments allows the opportunity to coordinate the ACRF data sets with those of other previous or ongoing field experiments.

- The ARM Program offers the scientific community the opportunity to link a number of smaller, established networks, or at locations with long-term data sets that can be combined into a coherent network.

ACRF Site Selection Considerations

Scientific Viability

- The criterion of scientific viability determines the ability to make accurate, useable, consistent measurements at a site with the existing technology.

- The site must be radiatively homogeneous in order to measure the radiative characteristics of the site on the scale of a GCM grid cell.

- The site must have uniform topography and surface cover.

- The site must not be significantly impacted bylarge emission point sources.

- The site must be a large, flat area, without significant obstructions for at least 1 km in every direction.

ACRF Site Selection Considerations

Logistical Viability

- The final criterion is that it must be logistically feasible to conduct the ARM experiment at the chosen sites.

- Fundamental facilities and provisions must be available. A navigable road is the minimum requirement for transportation of equipment, staff, and building supplies to the site. Access to power and communications capability must be available for the operation of machinery, sensors, and data systems.

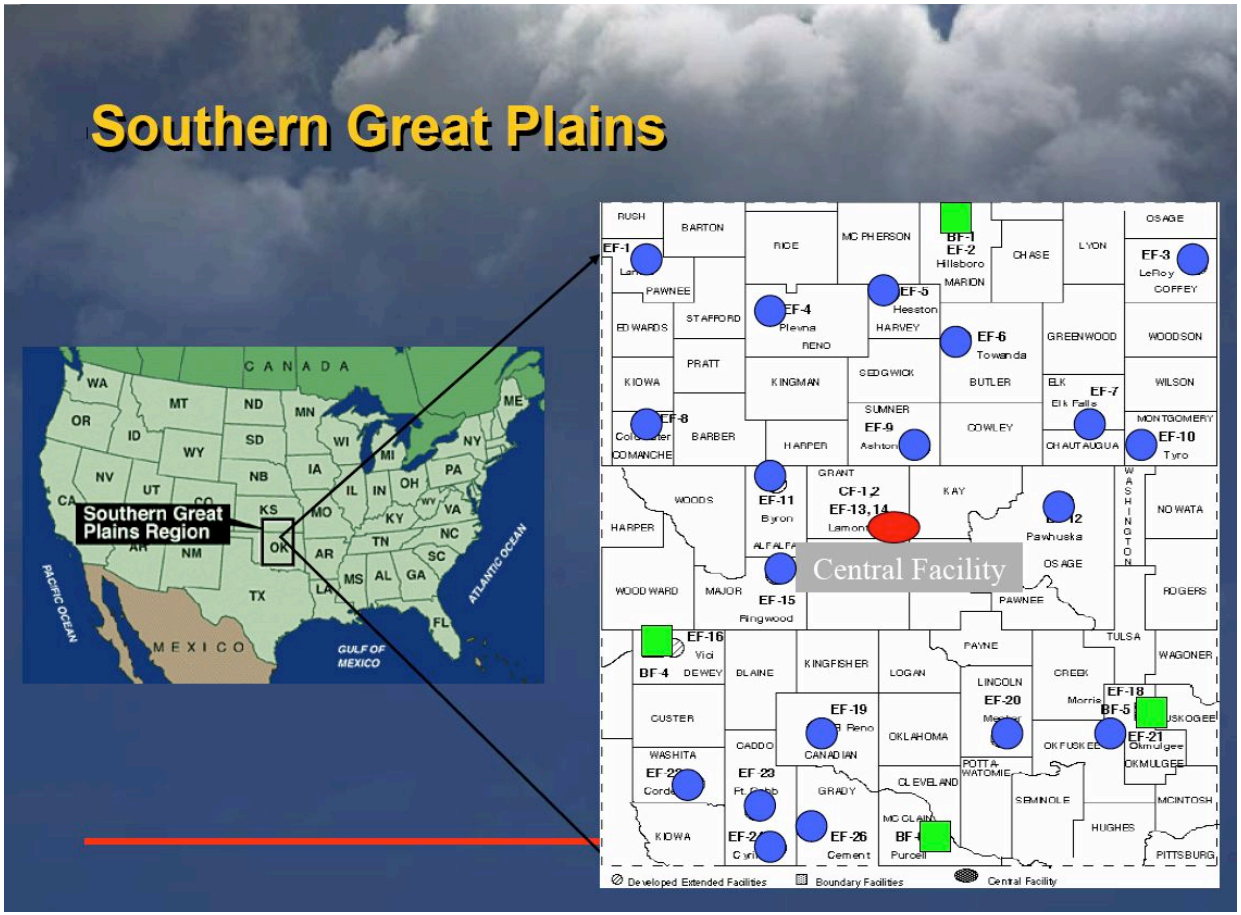
- The ACRF sites must be remote from populated areas: the equipment for ACRF requires radio frequency approvals and aviation approvals for radiosonde launches.

- The site must also be situated in an area that is free of political or regulatory restrictions.

ACRF Site Selection Considerations

Budget!

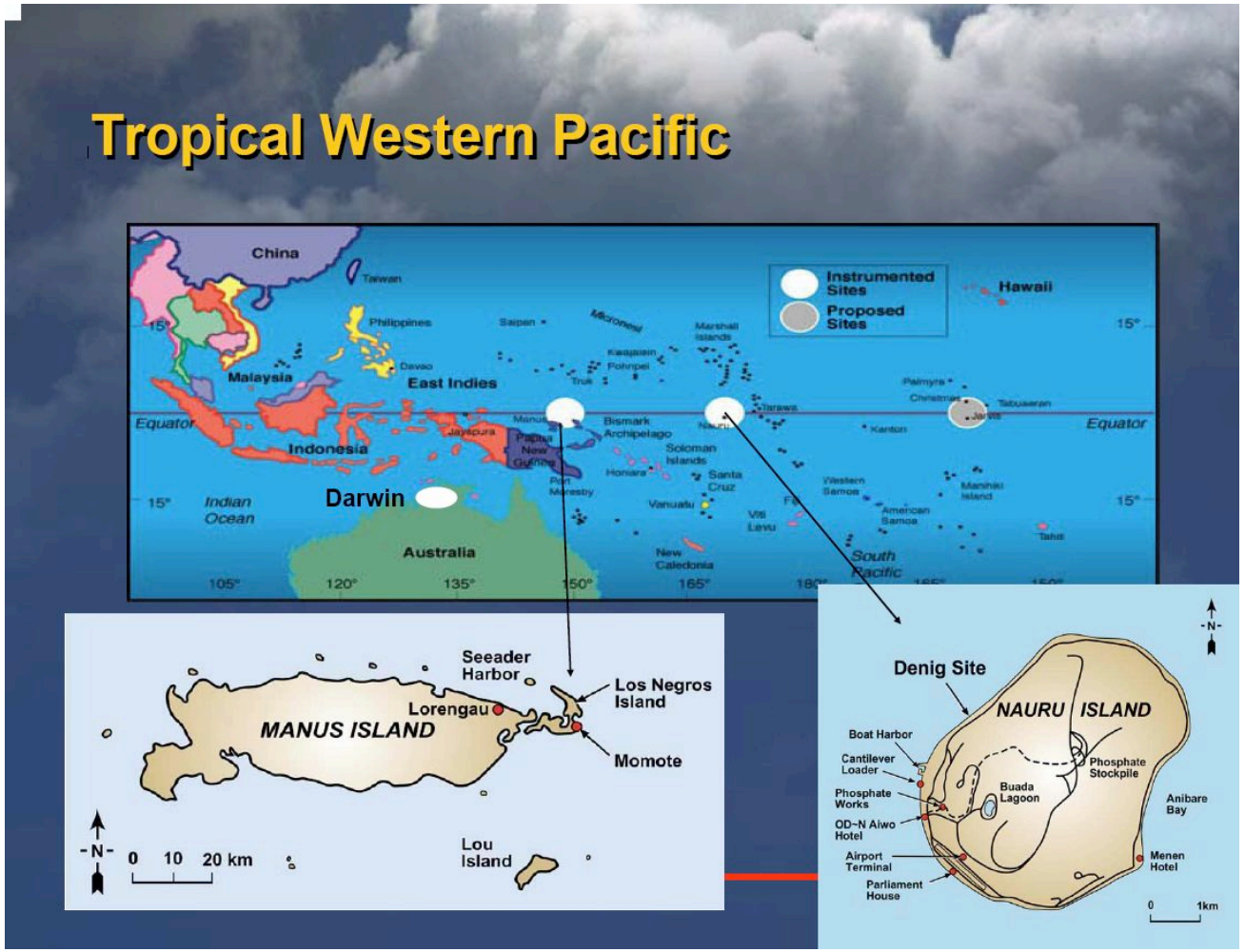
ACRF Fixed Site Locations
Southern Great Plains



ACRF Fixed Site Locations
Southern Great Plains

Central Facility (1992)

ACRF Fixed Site Locations
Tropical Western Pacific



ACRF Site Locations
Tropical Western Pacific

Darwin
(2003)

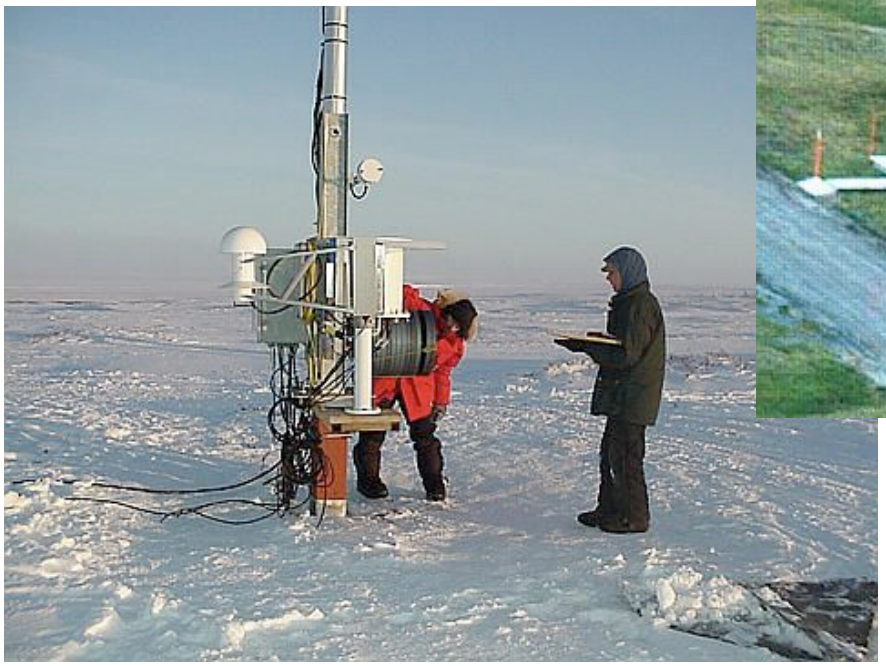
Manus
(1996)

Nauru (1998)

ACRF Fixed Site Locations
North Slope of Alaska

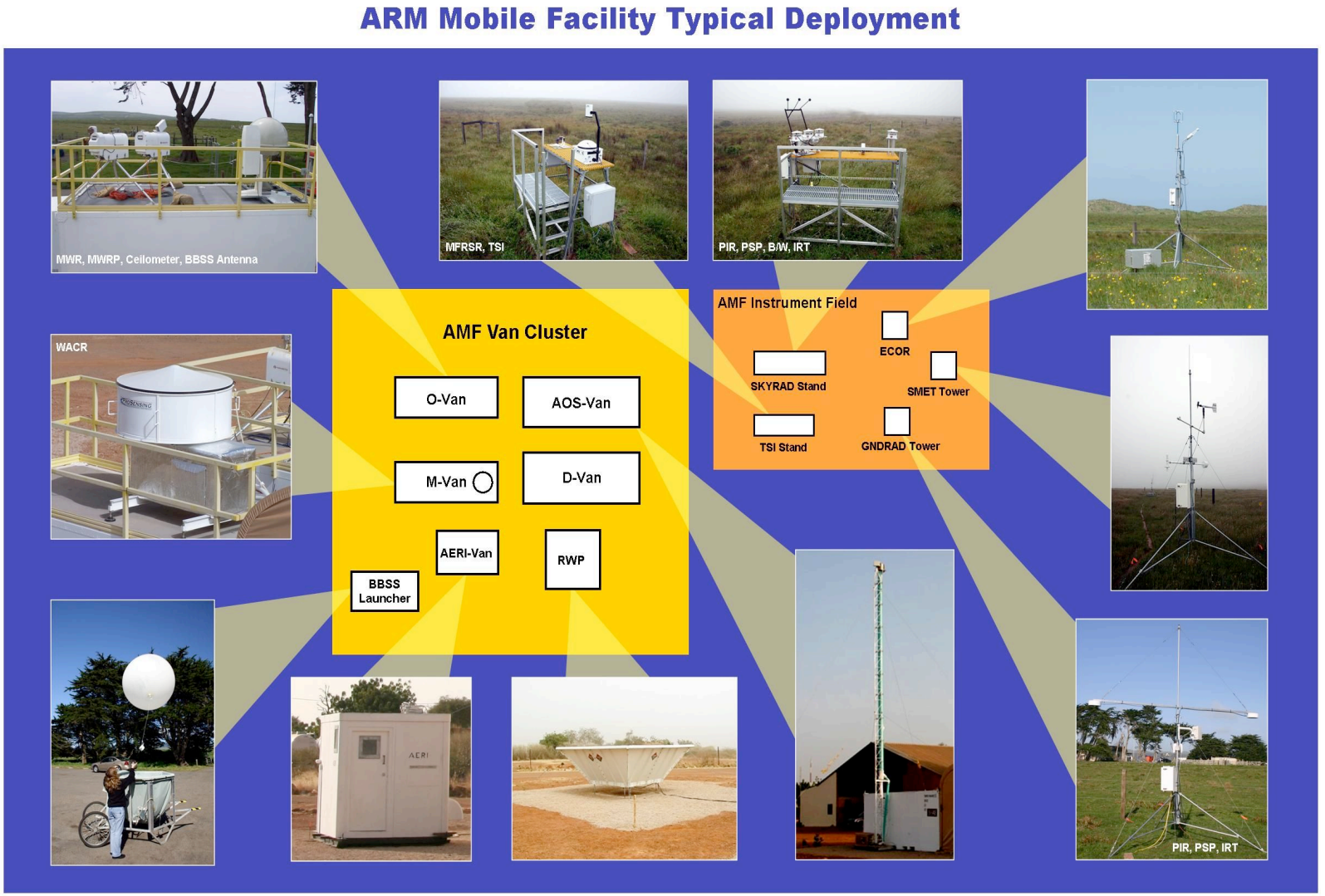
ACRF Fixed Site Locations
North Slope of Alaska

Barrow (1997)



Atqasuk (1999)

ARM Mobile Facility (AMF) Components



AMF California 2005

Marine Stratus, Radiation, Aerosol, and Drizzle (MASRAD) Project

To collect data from cloud aerosol interactions and to improve understanding of cloud organization that is often associated with patches of drizzle.

AMF Niger 2006

Radiative Divergence using ARM, GERB, and AMMA Stations (RADAGAST) field campaign.

To provide the first well-sampled, direct estimates of the divergence of solar and thermal radiation across the atmosphere.

AMF Germany 2007

Convective and Orographically Induced Precipitation Study (COPS)

To improve the representation of convective clouds in models and to develop strategies for determining cloud climatology in complex terrain.

AMF China 2008

Application of the ARM Mobile Facility (AMF) to Study the Aerosol Indirect Effects in China