

ASR Working Group Meeting

November 6, 2013

Wanda Ferrell

Rick Petty

ARM Program Managers



U.S. DEPARTMENT OF
ENERGY

Office
of Science

Office of Biological
and Environmental Research

BER Climate and Environmental Science Division (CESD) Mission 2015 Budget

- DOE/SC is operating on a 3.5 month Continuing Resolution
- BER is following the House mark which was a 20% reduction
- ARM has reduced costs to meet this budget level

ARM Update

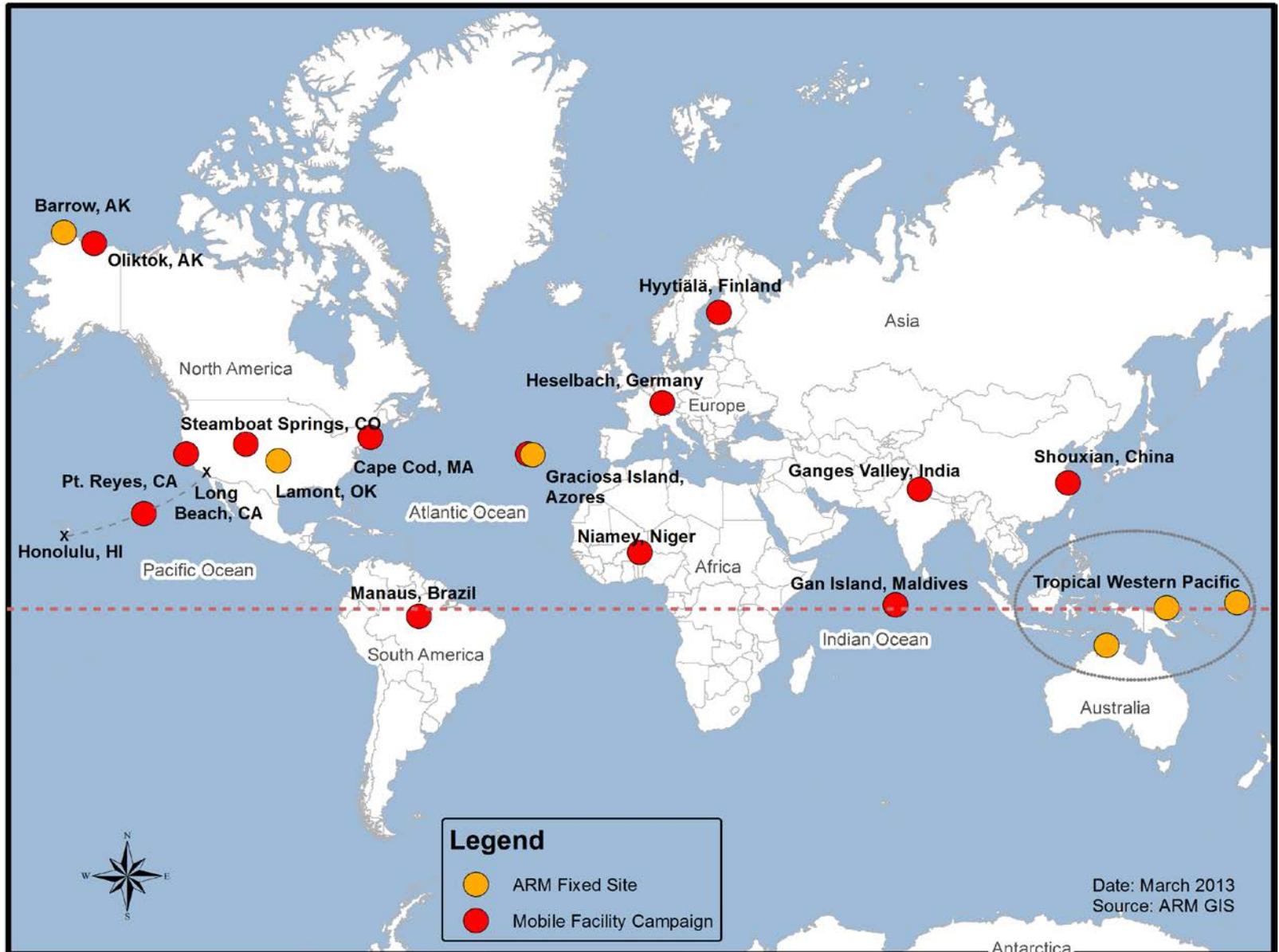
- Data are now flowing from the Oliktok and Azores sites.
- MAGIC and Cape Cod campaigns successfully completed.
- Biomass burning experiment successfully completed



Upcoming Campaigns

- GOAmazon will begin January 1, 2014 with AMF1 and G-1.
- Participants include DOE measurement capabilities supported by ARM, TES, ASR and EMSL. Additional measurements are being provided through support from NSF and Brazilian and German organizations.
- Campaign in Finland begins in February to examine impact of biogenic aerosols on clouds.
- ARM Cloud Aerosol Precipitation Experiment (ACAPEX) begins 2015 with AMF2 and G-1
- ARM West Antarctic Radiation Experiment begins late 2015 with AMF2

ARM Sites



Azores Instrumentation

Baseline instruments including an AOS are operating with following to be added in FY 2014:

- Scanning Cloud Radar (Ka/W)
- Zenith Cloud Radar (KAZR)
- X Band Precipitation Radar
- Raman Lidar
- 1290 Wind Profiler
- Doppler Lidar
- Eddy Correlation Flux Measurement System
- Microwave Radiometer, MWR3C
- ASSIST
- Parsivel
- 2DVD



Oliktok Instrumentation

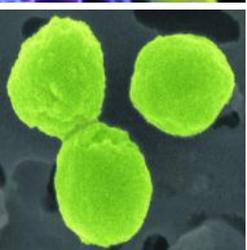
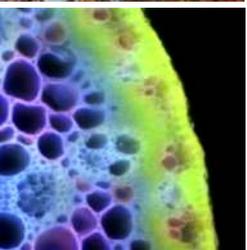
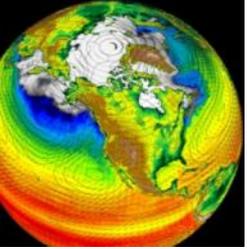
Baseline instruments are now operating with following to be added in FY 2014:

- Scanning Cloud Radar (Ka/W)
- Zenith Cloud Radar (KAZR)
- Snowflake Camera
- Mobile C-band Precipitation Radar
- Raman Lidar
- 915 Wind Profiler
- Doppler Lidar
- Eddy Correlation Flux Measurement System
- Total Precipitation Sensor
- Microwave Radiometer, MWR3C
- Extended Range AERI
- Tethered Sonde
- UAVs off the coast



Collaboration with EU Continue

- Monthly calls with leaders
- Intercomparison with lidars planned for IOP in Finland
- Radar and Retrieval groups have met



Systems science to meet DOE mission needs in bioenergy, climate and the environment.

<http://science.energy.gov/ber>

Thank you!



U.S. DEPARTMENT OF
ENERGY

Office
of Science

Office of Biological
and Environmental Research

Biomass Burning Observation Project (BBOP)

G-1 aircraft observation of aerosols from wildfires and agricultural burns (7/13 – 10/22)

ARM provided 120 G-1 flight hours, instruments, and supported ~ 30 scientists from 12 laboratories, universities, and industry

Motivation:

- 40% of global black carbon (BC) generated by biomass burning
- Year-to-year variability in aerosol loading attributed due to emissions from fires
- Model predictions range between warming and cooling
 - depends on morphology, composition, and co-emitted organics

Outcome: **It worked!**

- 17 wildfires (northwest), 30 agricultural burns (Mississippi valley), and 7 urban areas
- Demonstrated multi-month G-1 deployment
- Observed aerosol evolution: 0 to 5 hours
- Unique payload → Unique insights
 - SP-AMS, PTI, FIMS, microscopy, UV-PAS



Co-PIs: Larry Kleinman and Arthur Sedlacek



Strategic Planning Meeting for Polar Atmospheric Measurements Workshop (Science Questions)

- Modeling Gaps: What are the missing microphysical data that are limiting our ability to advance atmospheric models of the Arctic?
- How can UAS's serve to provide critical data to advance studies of permafrost/ ecology?
- How can technological advances be used to enhance measurement capabilities using UAS technologies?

The Marginal Ice Zone Observations and Processes EXperiment (MIZOPEX) utilizing DOE's RA-2204

MIZOPEX Study

- **Airspace used in advancing climate research was underscored:**
 - Airspace & growing science infrastructure should be made available to the broader science community.
- **Workshop recommended supporting research that would provide continuous measurements within RA-2204:**
 - UAS, tethered balloon, and ground stations (AMF3)

MIZOPEX Study Area



Pending Technology Advances

- Endurance & survivability
- Autonomous operations
- Collision avoidance
- Data transfer capabilities & on-board data processing
- Interoperability and modularity
- Size, Weight and Power (SWaP)

SBIR Atmospheric Measurement Technology Cycle 32 – Phase I Release 1 Awardees Topic 17a

- Compact, Lightweight Dynamic Saturation Cloud Condensation Nuclei Spectrometer for UAV Missions
- Compact Raman Lidar for Aerosol Extinction Profiling from Small UAVs
- Low SWAP LIDAR Instrument for Arctic Ice Sheet Mass Balance Monitoring

Topic 17b

- Infrared laser direct absorption spectroscopy for carbon isotope measurements from UAVs
- Compact QCL spectrometer for carbon isotopologue measurements from Small UAVs

[FY 2013 Phase I Release 1 SBIR/STTR Award Selections](http://science.energy.gov/~media/sbir/pdf/awards%20abstracts/fy13/FY13-Phase-1-Release-1Final.pdf)

<http://science.energy.gov/~media/sbir/pdf/awards%20abstracts/fy13/FY13-Phase-1-Release-1Final.pdf>

SBIR UAV Support

- **Phase II** - “Development of a Compact Instrumentation Package for Characterization of Aerosols, Turbulence and Surface Characteristics in the Unmanned Aerial Vehicles”,...Brechtel Manufacturing Inc.
- “A Compact, Low Power Depolarization Backscattering Cloud Spectrometer for Water and Ice Discrimination”,...Droplet Measurement Technologies.

DOE's ARM Proposed Path Forward for Performing Aerial Research in the ARCTIC

- DOE

- Manned Flights
- UASs
- Tethered balloons
- AMF3

- FAA

- RA - 2204
- WA
 - NOTAMS
- COAs



THANK YOU