ARM Updates

ARM-ASR Joint User Facility & PI Meeting

June 11, 2019

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Rick Petty

ARM Program Managers
Infrastructure Management Board Changes

- **Stephen Springston, BNL**
  - IMB member, 2016-2018
  - Measurements representative

- **Kim Nitschke, LANL**
  - IMB member, 2011-2018
  - AMF/ENA Site Manager

- **Adam Theisen, ANL**
  - New IMB member
  - Instrument Operations manager

- **Heath Powers, LANL**
  - New IMB member
  - AMF1, AMF2, ENA site manager
Tethered balloon activities – SGP April 2019

- Initial flights of the TBS were conducted at SGP for 17 hours from 4/25/19 - 5/1/19.

- SGP TBS flights may be conducted during daylight as high as 1 km AGL and must remain 150 m below cloud base.

- Aerosol instrumentation (two POPS and one CPC), anemometers, radiosondes, and distributed temperature sensing (DTS) optical fiber were deployed.

Images from Dari Dexheimer & Fan Mei
Future TBS Activities

• 2.5 weeks of flights at SGP in July 2019

• *Balloon-borne, Transverse Electromagnetic Measurement (BTEM)*: Determine the profile of electrical resistivity (PI: Robert Grimm)

• *Vertically-Resolved New Particle Formation and Transport Study (VNATS)*: Develop process-level understanding for the formation and growth of atmospheric aerosol aloft (PI: Chongai Kuang)

• *Initial flights of TBS aerosol filter samplers* to determine the minimum flight time required for sufficient sample collection

• August 2019 flights at the AMF3 in Oliktok Point
• Late Sep – Oct 2019 flights at SGP

• ARM is currently planning TBS deployments in FY20 and will issue a TBS activities call in the next few months.
Arctic shark

- Integration of scientific instruments
  - VectorNav (Position, Attitude)
  - AIMMS-30 (Meteorology)
  - CDP (Cloud Droplet Sizes)
  - RedEdge Camera (multispectral images)
  - POPS (Aerosol Size Distribution)
  - ACCESS (Aerosol composition, number, size, absorption)
  - Designing community inlet

- Test flights at Pendleton, OR UAS Range
  - Demonstrated safe operation mixed in with commercial and general aviation traffic
  - ADS-B in and out; onboard radios for communication with ATC and Visual Observers
  - Test flight up to 9500 ft msl
  - Plan to extend range with staggered visual observers

- SGP campaign delayed due to aircraft hardware issues; now planning for Fall 2019
ARM Manned Aircraft Status

- G-1 aircraft was retired after successful CACTI campaign Nov/Dec 2018
- PNNL leading the formal project management process for a replacement aircraft
  - Alternatives analysis – identified purchasing used aircraft as best option
  - ARM received full funding for replacement aircraft in FY2019 appropriation
  - Rigorous analysis of aircraft models; request for proposals for aircraft Jan 2019
  - Awarded contract for a Bombardier Challenger 850 aircraft in May 2019
  - Finalizing aircraft modifications statement of work – will require extensive modifications to be ready for atmospheric research
  - Aircraft expected to be ready for first research mission by 2022
New data products

- ARM is continuously developing new data products, processing products for additional dates/sites, & improving data discovery

- Recent focus on data from AMF deployments

- Check ARM newsletter for ‘Data Announcements’

- Provide input on data product priorities through Working Groups and Breakout Session reports

- Submit your own data as an ARM PI Data Product

- ARM Data Booth – in Lobby
  - Questions about how to get ARM data? Questions about ARM computing? Stop by during coffee breaks or break-out session times

- ARM Data Discovery – Wed lunch session
ARM Mobile Facility Workshop

- Workshop held summer 2018 to get input from the scientific community on the scientific objectives, research challenges, and opportunities for the ARM Mobile Facility (AMF) capabilities

- Co-chairs:
  - Rob Wood, University of Washington
  - Guang Zhang, Scripps/UCSD
  - Nicki Hickmon, Argonne

- Solicited input & white papers from research community

- 26 scientific attendees discussed high priority meteorological regimes or regions of scientific interest; improving coupling and integration of AMFs with models; increasing AMF impact

- Workshop report published April 2019
AMF3 Redeployment

- AMF3 designed as an “extended term” mobile facility
- Planned for ~5 year deployments
- Deployment at Oliktok Point became operational Sep 2013
- Extended AMF3 deployment through end of FY20 as part of BER commitment to MOSAIC and YOPP

- BER currently anticipates moving the AMF3 from Oliktok Point in FY21
- Some instruments will likely remain through spring FY21 to support planned activities
- Plan to deploy to a new site in the Southeast US; with operations beginning by Sep 2022
- More details & timelines to come
Field Campaigns
Campaign Proposal Process

• Small Campaigns
  – Pre-proposals accepted year-round
  – Reviewed & approved quarterly
  – Level of campaign determines need for proposal, type of review, decision timeline and start time after decision
  – Plan ahead for small campaigns!
  – Data submission & final report within 6 months of campaign end

• AMF/AAM Campaigns
  – Requests for AMFs and AAF competed through annual call
  – Timing of annual call has changed:
    • Call issued in Dec
    • Pre-applications in April
    • Full applications in Aug
    • Science Board review in late fall
  – [https://www.arm.gov/research/campaigns](https://www.arm.gov/research/campaigns)
Sampling of small campaigns

• Water vapor campaigns at SGP
  – Micropulse Dial (MPD) Network Demonstration; PI - Tammy Weckwerth
  – Demonstration of a new water vapor radar; PI – Matt Lebsock

• Aerosol campaigns at SGP and NSA
  – Small particle growth and aging at SGP; PI – Don Collins; Sept 2019 – June 2020
  – POPSnet-SGP: A Pilot Aerosol Microphysical Network; PI: Allison McComiskey; Sep 2019 – Aug 2021
  – Aerosol ice-formation pilot closure study; PI - Daniel Knopf; Oct 2019
  – Examining the Ice-Nucleating Particles at the SGP; PI - Naruki Hiranuma; Oct 2019
  – Agricultural Ice Nuclei at SGP; PI – Susannah Burrows; June 2020 & April 2021
  – Biogenic Emissions and Aerosol Response on the North Slope; PI – Rebecca Sheesley; June 2019 – Aug 2020
  – Arctic Aerosol Sources & Mixing States; PI – Kerry Pratt; Oct 2018 - 2020

• Other
  – Snow Albedo Evolution (NSA); PI – Matthew Sturm; May 2019 – June 2021
  – Atmospheric Electric Field Mill Sensor (ENA); PI – Hugo Silva; 2014 - 2019
Recently Completed Campaigns

• CACTI (Cloud, Aerosol, and Complex Terrain Interactions)
  – PI Adam Varble, U. Utah
  – AMF1 deployed to north-central Argentina - Aug 2018 – Apr 2019; G-1 Nov-Dec, 2018
  – Coordinated with NSF RELAMPAGO campaign
  – Improve understanding of cloud lifecycle and organization in relation to environmental conditions in order to improve cumulus, microphysics, and aerosol parameterizations
  – Breakout session yesterday
  – Plenary presentation Thursday morning
Upcoming campaigns (1)

- **MOSAiC Atmosphere**
  - PI Matt Shupe, U. Colorado/NOAA
  - AMF2 to deploy on *Polarstern* icebreaker, which will be frozen into and drift with Central Arctic sea-ice for 1 year; Sep 2019 – Oct 2020
  - Target atmosphere and atmosphere-surface interactions that are critically under-observed in the Arctic and are leading contributors to model uncertainties in the region

- **COMBLE (Cold-air Outbreaks in the Marine Boundary Layer Experiment)**
  - PI Bart Geerts, U. Wyoming
  - AMF1 deploying to Andenes, Norway; supplemental measurements on Bear Island in the N. Atlantic
  - January to May 2020
  - Goal: quantify the properties of boundary layer convection and air-mass transformations in cold-air outbreaks over open water in the Arctic

- **Joint breakout session Wed afternoon**
Upcoming campaigns (2)

• TRACER (Tracking Convection Interactions Experiment)
  – PI: Mike Jensen, Brookhaven National Lab
  – AMF1 and C-SAPR2 to Houston, TX area to study aerosol-cloud interactions in deep convection
  – Houston offers unique environment where isolated convective systems are common and experience a spectrum of aerosol conditions from
  – April 2021 – April 2022; with an intensive operational period in summer 2021
  – ARM call for guest instrument deployments forthcoming later this summer/fall

• Breakout session Wednesday morning