Aerosol Life Cycle Working Group

Allison McComiskey, Jian Wang, (co-chairs), Rich Ferrare, Gannet Haller, Larry Kleinman, Rahul Zaveri & Jerome Fast, Connor Flynn (translators)

Charge: Produce document giving 5-10 year guidance to ASR on Field Studies

Why? Science questions

Where?
When? Venue = place and time

How? Operations

Interactions with broader community

Science Questions

Process Driven:

- Emissions
- NPF and growth
- Time evolution of chemical and physical properties
  - Direct effects: Optics & Radiative
  - Indirect effects: CCN
- Transport, Removal, and Lifetime

Venues

Best Places and Times to Examine Processes:

- Regions where climate is perturbed
  e.g. GEVAX
- Climatically important aerosol types
  e.g. Biomass burning
- Atmospheric laboratories
  e.g. CARES
- Time
  e.g. Winter vs. summer: Dry vs. wet season

Process * Venues = 2D Matrix

A natural association of process and venue

- Coordination and coverage are explicit
- Picking highest rated proposal each year does not a program make

Processes studied in multiple venues yield contrasts which test our understanding

Goal is to produce a prioritized list for 5 – 10 years

Realism:

It is often advantageous to join broad community that may have their own agenda

Some problems are idea or equipment limited.

Watch out for 500 lb gorillas

Operations

Aerosol LifeCycle process driven research is a better fit with ASP style Aircraft IOP than ARM style multi-month deployment

LifeCycle studies need not be tied to longer term cloud-radiation objectives. Synergisms should be considered case by case.

Platforms: What is realistically available? AMFs?

There is a valued place for small science – no aircraft, only a few ACRF instruments

Locations

- Northern Hemisphere
  - Aruba
  - Jamaica
  - Bermuda
  - Bahamas
  - Key Largo
  - Montego
- Southern Hemisphere
  - Bali
  - Bora Bora
  - Moorea
  - Fiji
  - Christmas Island
  - Rarotonga

End of discussion

Summary of recommendations

•Aerosol Lifecycle processes should be defined along with the best venues (location or time of year) for their study.

•Process and venue recommendations should be combined in a 2D matrix that indicates the coordination between field campaigns.

•Processes should be studied in multiple environments to provide contrasts that test our understanding.

• Prior process-oriented field campaigns conducted under ASP provide a starting point for the design of field campaigns under ASR using ACRF instruments and platforms.

• The ASP model of conducting intensive 4 – 6 week field campaigns should be adapted for the study of Aerosol Lifecycle processes. A large field campaign would use one or more instrumented aircraft and surface sites consisting in part of the MAOS trailers.

• Consideration should be given to using the ACRF surface equipment to conduct longer term measurements so as to capture seasonal changes, provide a more statistically sound data base, and satisfy objectives besides those connected to the Aerosol Lifecycle. This should not be a requirement, if science objectives and competing demands for ACRF trailers dictate otherwise.

• Small scale field measurements should be encouraged as a cost effective way to target specific science questions.

Concluding Thought

Our goal should not be producing parameterizations for GCMs

BUT

The utility of our efforts will (and should) be judged on how proficient we are in finding Nature's simplifications

Unabashed Advertisement
Field Campaigns – with G-1

- There is a lot of data sitting on our shelves

  WE WANT TO SEE IT USED
  WE WILL HELP

- Opportunities for collaboration
  - Modeling
  - Measurements (surface and air)
  - Analysis

Location year (new instruments)

- **Photo-oxidants**
  - Nashville 1995
  - NYC 1996
  - Phoenix 1998
  - Philadelphia 1999
  - Houston 2000
- **Aerosol**
  - Northeast 2002 (AMS)
  - Pittsburgh 2004 (PILS)
  - Mexico City 2006 (PTR-MS, SP2)
- **Marine Stratus**
  - Pt. Reyes, CA 2005
  - Arica, Chile 2008 (FIMS, PTI, fast μ physics)