MAOS represents a new measurement standard for AOS platforms

- 19 instruments vs “core” 7 instruments
- Inclusion of research grade instruments (new AOS paradigm)
- Two 20-ft SeaTainers
- Platform is geared towards IOP-based deployments

See Stephen Springston for more details regarding the new generation AOS platforms
Aerosol Lifecycle IOP: background

MAOS is composed of two 20’ SeaTainers (MAOS-A & MAOS-C)

<table>
<thead>
<tr>
<th>ACSM</th>
<th>Ozone</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCN-200</td>
<td>PSAP</td>
</tr>
<tr>
<td>CPC (&gt; 10 nm)</td>
<td>PASS-3</td>
</tr>
<tr>
<td>CPC (&gt; 2.5 nm)</td>
<td>PILS</td>
</tr>
<tr>
<td>CO</td>
<td>PTRMS</td>
</tr>
<tr>
<td>f(RH)</td>
<td>SMPS</td>
</tr>
<tr>
<td>HTDMA</td>
<td>SO$_2$</td>
</tr>
<tr>
<td>MET station</td>
<td>SODAR</td>
</tr>
<tr>
<td>Neph</td>
<td>SP2</td>
</tr>
<tr>
<td>NO, NO$_2$, NO$_y$</td>
<td>UHSAS</td>
</tr>
</tbody>
</table>

All items in red represent core AOS instrument suite (AMF-I, AMF-II, & TWP)
Aerosol Lifecycle IOP: Infrastructure Motivation

- Conduct a ‘shake out’ of the MAOS platform prior to the GVAX campaign
- Develop & test new measurement strategy(ies)
  Many of the instruments new to ACRF are operator intensive (PILS-IC-WSOC & PTR-ToF-MS)
  Some instruments generate huge data sets (PTR-ToF-MS & SP2)
- Instrument Intercomparisons
  PSAP, CPC, Nephelometer, CCN (3 units)
  HR-AMS against ACSM
- Training of Indian Post-Docs in preparation for 2012 GVAX campaign
Opportunity to conduct intensive aerosol observations in a region that offers biogenic, marine and urban emissions.

- Urban emission dominated air from the west and southwest
- Biogenic emission dominated air from the north and northeast
- Atmospheric transport time of hours to days
- Absent strong synoptic forcing, a sea breeze develops in the afternoon
- Haze events (pollution alerts) can be expected
- Good chance of catching an intense but distant biomass burning event

Examples of previous northeast corridor studies:

- 1998-2002: Northeast Oxidant and Particle Study (NE-OPS)
- 1999/2000: Maryland Aerosol Research and CHaracterization (MARCH-Atlantic)
- 1998: Tropospheric Aerosol Radiative Forcing Observational Experiment (TARFOX)
Surface: Precipitation

2 meters: Temp, RH, Pres

10 meters: Temp, Wind Spd, Wind Dir

85 meters: Temp, Wind Spd, Wind Dir

Anticipate measurements of T, WS, & WD at 50 meters next year
Three foci of scientific inquiry are envisioned:

- Optical Properties
- SOA Formation
- CCN activity

A key component of these three focus areas is that aerosol properties will be determined as function of atmospheric processing and chemical conditions or source type.
• Is there agreement between different SOA proxies: Δorg (over POA), OOA (PMF), and WSOC (PILS)?
• Does SOA formation rate depend on emission source types (anthropogenic vs natural)?
• Are there synergistic effects in SOA formation due to fast reacting biogenic organics?
• Is it possible to link SOA formation to cloud processing?
• Is it possible to identify highly oxygenated compounds (e.g., SVOC) that are responsible for SOA formation?
Cloud activation properties of aerosol particles (Wang)

- Examine the influences of size distribution, chemical composition, and mixing state on aerosol CCN spectrum.
- Derive particle hygroscopicity ($\kappa$) from size-resolved measurements of CCN activation spectra.
- Derive/constrain the hygroscopicities of major organics classes (e.g. HOA, OOA, etc) by combining size-resolved CCN and composition measurements.
- Examine the CCN properties of organic species as functions of O:C ratios and photochemical age.
Aerosol Light Absorption (Sedlacek)

- How does the aerosol mass absorption coefficient (absorption per unit mass of BC) vary with atmospheric processing?
- Constrain BC coating thickness estimates utilizing UHSAS, CPC and SP2 and composition with AMS.
- Utilizing the above data, evaluate how well observations agree with a shell-core model?
- Using NO$_x$ - NO$_y$ as a proxy for age, examine correlation between BC CCN activity with age (degree of processing).
- Examine degree of processing-induced morphology changes in BC (using BNL nanoscience TEM/SEM facilities).
Aerosol Lifecycle IOP Site

IOP dates: July 15, 2011 - September 15, 2011

Collaborations, thus far...

Dr. Qi Zhang (U. Davis): High-Resolution Time-of-Flight AMS (HR-ToF-AMS):
- ACSM intercomparison
- SOA science: size resolved aerosol chemical composition and unambiguous elemental composition of organic mass fragments
Summary

Interested parties should contact either:

Art Sedlacek  sedlacek@bnl.gov
Larry Kleinman  kleinman@bnl.gov