EDWARD DUNLEA, Peter DeCarlo, Joel Kimmel, Allison Aiken, Jose L. Jimenez, Cooperative Institute for Research in Environmental Science, University of Colorado, Boulder, CO. Address correspondence to edward.dunlea@colorado.edu

Goals of INTEX-B Campaign
Intercept Asian Pollution During Transport Across Northern Pacific Ocean

AMS Performance During INTEX-B Campaign
• Final deployment of HR-ToF-AMS. 2005 on INTEX-B, May 2006 on DC-8. 
• Operational problems on DC-8

AMS Mounted in HIAPER Instrument Racks
• Custom built instrument rack
• Data collection stand-alone instrument pre-filtering and the HR-ToF-AMS
• slang and radiation

AMS Inlet System
• Teflon tubing - 1/16" inside diameter, 16" long
• Cylindrical entrance to minimize any flow distortion
• Teflon tubing - 1/8" inside diameter, 16" long

Previous Observations
• Asian Transport
  • Storm Peak, 2004-Apr
  • ACE-Asia, 2001-Apr

• Validation of chemical and transport models & satellite measurements
• Asian pollution estimated to enhance N. American surface O3 by several ppb, aerosol mass loading enhanced by 0.1
• For description of HR-ToF-AMS see DeCarlo talk 8D4, Wed. 12:20pm

• Data!

• Asian pollution estimated to enhance N. American surface O3 by several ppb, aerosol mass loading enhanced by 0.1

• For description of HR-ToF-AMS see DeCarlo talk 8D4, Wed. 12:20pm

• Data!

• Asian pollution estimated to enhance N. American surface O3 by several ppb, aerosol mass loading enhanced by 0.1

• For description of HR-ToF-AMS see DeCarlo talk 8D4, Wed. 12:20pm

• Data!

• Asian pollution estimated to enhance N. American surface O3 by several ppb, aerosol mass loading enhanced by 0.1

• For description of HR-ToF-AMS see DeCarlo talk 8D4, Wed. 12:20pm

• Data!

• Asian pollution estimated to enhance N. American surface O3 by several ppb, aerosol mass loading enhanced by 0.1

• For description of HR-ToF-AMS see DeCarlo talk 8D4, Wed. 12:20pm

• Data!

• Asian pollution estimated to enhance N. American surface O3 by several ppb, aerosol mass loading enhanced by 0.1

• For description of HR-ToF-AMS see DeCarlo talk 8D4, Wed. 12:20pm

• Data!

• Asian pollution estimated to enhance N. American surface O3 by several ppb, aerosol mass loading enhanced by 0.1

• For description of HR-ToF-AMS see DeCarlo talk 8D4, Wed. 12:20pm

• Data!
Acidic Aerosol Observed in Asian Pollution

- Low altitude Seattle pollution shows high Org/SO4 ratio, indicating low anthropogenic influence.
- Asian pollution shows lower Org/SO4 ratio than expected, suggesting different atmospheric processing.
- Aircraft emissions may be a contributor to this observed Org/SO4 ratio.

Organic Aerosol formed relatively quickly (precursors consumed) compared to sulfate formation. Their Precursors

- Sulfate peaks found in these flights are indicative of fresh aromatic fragment (m/z 91), non-oxygenated fragments (CxHy).
- SO2 available to begin aerosol formation after scavenging event.

Processing of Asian Aerosol During Trans-Pacific Transport

- Event scavenging, via lifting in storm system, removes aerosol mass (organic and/or sulfate).
- Asian pollution events helped to move SO2, then scavenging event helps SO2 to begin aerosol formation after scavenging.

Further POA and New Aerosol

- Asian pollution shows enhanced H2SO4 and fragments in high altitude layers intercepted over ocean.
- SRM signal can be observed in these layers, indicating significant aerosol formation.

Acidic Aerosol Observed in Asian Pollution

- Low altitude Seattle pollution shows high Org/SO4 ratio.
- Asian pollution shows lower Org/SO4 ratio than expected, suggesting different atmospheric processing.
- Aircraft emissions may be a contributor to this observed Org/SO4 ratio.

Organic Aerosol formed relatively quickly (precursors consumed) compared to sulfate formation. Their Precursors

- Sulfate peaks found in these flights are indicative of fresh aromatic fragment (m/z 91), non-oxygenated fragments (CxHy).
- SO2 available to begin aerosol formation after scavenging event.

Relative to SO2

- Relative to SO2, SO4 is scavenged slower, indicating its formation is dependent on other reactions.
- Asian pollution events help to move SO2, then scavenging event helps SO2 to begin aerosol formation after scavenging.

Emissions of Organic

- Asian pollution shows complete lack of organo-nitrate or organo-sulfate emissions.
- Known marker for biomass burning, possible evidence for this process.

Organic Aerosol and Sulfate

- Central Valley and Seattle pollution shows clear enhancements in organics.
- Asian pollution shows clear enhancements in sulfate.
- See graphs to right for organics.