ARCPAC Planning Meeting  24 August 2007

Outline:

1) Very brief review of the key science questions (Chuck)
2) Overview of flight schedule and profiles

3) Instrumentation and integration, schedule (Tom)

4) Facilities overview (Gerd)

5) Other logistical issues (hazmats, shipping, security clearances, etc.)
   Security clearances: Ann Middlebrook
   Flight safety clearances: Chuck Brock
   Cargo shipping: Gerd Hubler
   Compressed gas and hazmats: John Nowak and Andy Neuman

6) Preparations for the AGU meeting in December (Fred)
Sea-ice extent this August is already at record low levels (<4.9 million km\(^2\) vs. previous low of 5.2 million km\(^2\))

Annual minimum occurs in mid-September.

Thick, multi-year ice is also at record lows.

Ice-free Arctic summers by 2030? Yikes!
ARCPAC: Aerosol, Radiation, and Cloud Processes affecting Arctic Climate

Science and Implementation Plan

The question: Are aerosol and aerosol-cloud processes significantly contributing to Arctic warming and sea ice melting?

The response: An airborne mission that makes use of our unique capabilities to study relevant processes and observationally constrain climate models.

http://www.esrl.noaa.gov/csd/ARCPAC/

A NOAA Climate Forcing Program Project for the International Polar Year 2008

June 2007
Science Questions to be Addressed

Primary Questions:

Q1: What are the chemical, optical, and microphysical characteristics of aerosols in the Arctic in springtime?

Q2: What are the source types (industrial, urban, biomass/biofuel, dust, sea-salt) of the aerosol components, and the absorbing components (soot) in particular?

Q3: What are the microphysical and optical characteristics of optically thin clouds in the lower Arctic troposphere in springtime, and how do aerosol particles affect these cloud properties and vice versa?

Secondary Questions:

Q4: What are the concentrations of particles that serve as ice nuclei (IN) in background and polluted air, and is soot an effective IN?

Q5: What halogen chemistry is occurring during Arctic spring?
Linkages with other IPY efforts

Fairbanks
- In situ process studies
- Soot, clouds, tracers
- Vertical structure
- NASA, Environ. Canada

Barrow
- Long-term monitoring of aerosols, trace gases
- Remote sensing of clouds, radiation
- DOE, Environ. Canada

Greenland & Barents Seas
- Fresher pollution: aerosols, trace gases
- Remote sensing of clouds, radiation
Air Quality Aspects

While this is primarily a climate research project, NOAA’s Air Quality Program has overlapping interests and is contributing significantly to covering program expenses.

Will use the payload to investigate cold-weather particle properties and processes in Denver, Fairbanks, and Prudhoe Bay.

Expect increased role by nitrates and semi-volatile organics due to partitioning and relative lack of gas-phase SO$_2$ oxidation.

First application of P-3 aerosol payload in the Rocky Mountain urban areas.

Lays groundwork for potential future Front Range aerosol study (surface or Erie Tower), and California 2010 campaign where nitrates and organics often dominate.
Flight Hours and Breakdown

~120 hrs total

35 hrs transit Tampa--Metro (JeffCo)-- ? --Fairbanks and return

85 hours local science
  ~10 hours Front Range area
  ~75 hours (9x 8.3 hr flights) Fairbanks area

Key dates:
  28 March arrive in Fairbanks
  1 April begin science flights
  23 April depart Fairbanks

Tom Ryerson will present more detailed schedule.
2008 Denver urban survey flights

- 2 flights, 4-6 hours duration each
- Long crosswind transects at minimum safe altitude
- Short profiles to 9000’-12000’ MSL and return
- Pollution pushed up against Front Range
2008 Arctic flights

- 8 to 8.5 hours duration
- Long, stairstep transects hunting for pollution layers
- Profiles to 18-25,000’ over Deadhorse & Barrow
- Penetrations of thin stratiform clouds
2008 Arctic flights

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Some Logistical Notes

2007 Temperature Summary (Fairbanks, AK)

Graph showing temperature trends from January 1, 2007, to December 1, 2007, with lines representing normal high, normal low, 2007 high, 2007 low, record high, and record low temperatures.
Some Logistical Notes

Fairbanks Sunrise Sunset
1 April 06:05 19:46
23 April 04:45 20:56

No nighttime flights!

Passports should be obtained/up-to-date in case of stops in Canada (note very long processing times--apply now. Visa implications?)

University of Alaska-Fairbanks very supportive--facilities, waste handling. Suggest we reciprocate with seminars/tours, project updates, etc.

Will be sharing space (hangar and office/lab) with NASA, DOE/Environment Canada. Might be outnumbered 4:1 at times.

We are spreading management load:
• Chuck Brock and Dan Murphy--project organization, science leads
• Ann Middlebrook--security clearances
• John Nowak and Andy Neuman--hazmats shipping, storage, acquisition
• Gerd Hübler--facilities and shipping
• Cathy Burdorf--IT and office infrastructure
• Chuck Brock--flight safety training and medical clearances
• Tom Ryerson--aircraft instrument coordinator
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P-3 integration and scheduling - ARCPAC 2008

• Expect to receive a few emails in the next days and weeks:

  - IPY integration and deployment schedule (version 1)
  - New P-3 Installation Guide and questionnaire
    questionnaire due **Monday, October 1, 2007**
  - MacDill clearance forms

• These and other necessary documents are posted:

  [http://www.esrl.noaa.gov/csd/ARCPAC/](http://www.esrl.noaa.gov/csd/ARCPAC/)
  name and password required - see emails

• Other things still being worked out:

  - MacDill, Jeffco, and Fairbanks hazmat policies
  - Jeffco and Fairbanks security clearances
NO, NO₂, NO₃, O₃; CO₂; FltSci laptop
H₂O TDL
Aerosol low turbulence inlet (LTI)
White-light optical particle counter

Sub-micron aerosol extinction as f(RH), total dry extinction; absorption; size distributions

NO₂; CO laptop
PANs; SSFR/CG4
SO₂; Halogens

Actinic fluxes

Cloud Physics probes

CCN

PILS; AMS

PILS; NMASS

SO₂; CO laptop

Flasks

Sp2; cloud probe data

Operators: seats

NO₃/O₃/CO₂; C3X
CRD-AES: Sta. 2
PILS/AMS: Sta. 3
CIMS: Galley
SP2: Galley
others TBD
P-3 schedule summary

• Integration *tentatively* begins Tuesday, January 22
  8 weeks of integration
  working hours will be M-F, 8 hours/day
  specific instrument’s schedule TBD

  *(may try to install selected instruments prior to Jan. 22)*

• Transit to Denver - Thursday, March 20

• Transit to Fairbanks - Friday, March 28
  *(may require refueling stop en route)*

• Transit to Denver - Wednesday, April 23
  *(may require refueling stop en route)*
  un-install at NCAR RAF facility
IPY 2008 N43RF target schedule v1

Jan 2008

6 7 8 9 10 11 12

13 14 15 16 17 18 19

20 21 22 23 24 25 26

MLK Day

???

27 28 29 30 31

IPY integration

IPY integration
# IPY 2008 N43RF target schedule v1

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**Events:**
- **IPY integration**
- **Groundhog Day**
- **President’s Day**
- **Hangar door replacement**
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UAF & NWS
Red circle indicates the old Everts Air Fuel aircraft hangar. Office space is street-side of the whole hangar front.
Lodging

• Sophie’s Station:
  http://www.fountainheadhotels.com/sophie/sophie.htm

• NOAA & CIRES: Bernie Johnson will do the reservation for everyone in CSD whatever their group affiliation

• People outside NOAA/CIRES: Please, make your own arrangements

  • Chuck has preliminary participants list, I will contact every group to verify
Transportation Logistics

- MacDill, Denver/Boulder, Fairbanks:
  - as before shipments to and from all sites, fast & slow, incl. hazmat
  - you know the drill for MacDill and Boulder area
  But fast transport to AK only via air = expensive
  PLEASE, try to economize: share tools, fittings, etc. wherever possible

Gases will go to AK overland direct from vendor, roads are open in winter, but delays due to winterstorms might occur

We will need to know your special needs: what can’t leave before the aircraft takes off but must arrive before the aircraft lands. I will send out query to all