Scientific Committee for Oceanographic Aircraft Research (SCOAR)

October 14 & 15, 2003

Ocean.US Office
2300 Clarendon Blvd., Suite 1350
Arlington, VA

Appendices

I Agenda

II Attendees

Welcome – Eric Lindstrom, immediate past director of Ocean.US

Present are John Bane, Chair, Charles Flagg, Carl Friehe, Ken Melville, Dan Reimer, Cheryl Yuhas, Bob Bluth and Mike Prince.

Introduction – John Bane introduced the major subjects for the agenda.

- What measurement capabilities do CIRPAS aircraft need to support the broadest community?
- The impact of ocean observatories and the need for aircraft for observatory work.
- New committee members, identify potential candidates.
- Another potential subject matter is whether or not to bring in other aircraft facilities, however it makes sense to develop the protocols and procedures surrounding the committee's and community's interaction with CIRPAS first.

Discussion

Challenges to using aircraft for research, including diminishing numbers of aircraft operators, the regulatory difficulties of getting airworthiness certificates when aircraft are modified for instrumentation, and no coherent organization that brings the operators, users and agency supporters together, such as UNOLS does for research vessels.

We should work towards standard instrumentation accommodations and supplemental certifications that would allow an easier path.

Increasing the availability of aircraft will require a mechanism that will allow relatively painless access to these aircraft by ocean sciences.

There is a need to accommodate some people working in more of an operational mode and others working in a basic research mode. Operational and observational modes may tie up assets for significant periods of time and with significant frequency.

Based on the discussion there are several points:

- There are ocean research needs that can be fulfilled by aircraft
- There are existing facilities
- What is the gap between projected needs and existing facilities?
- Large, long-range aircraft are almost exclusively operated by agencies
- UNOLS research vessels are operated by individual institutions
- What is the incentive for agency aircraft to be scheduled and shared like a UNOLS vessel?
- ICAGGRA was developed as an interagency coordinating body, but there is no agency-institution-community forum.

Challenges for CIRPAS:

- People to support data acquisition and operations
- The facilities may not always be appropriate
- Scientists to provide the data reduction and science planning
- Instrumentation development has outpaced their ability to support the new instrumentation
- There are limitations on the use of expendable sensors; CIRPAS's PIs are sometimes "held captive" by having to use off-the-shelf instrumentation.

Solutions:

- Define a standard suite of instrumentation that can be operated with the normal support structure of the aircraft operator
- Identify standard protocols and adaptations for accommodating user-provided instrumentation
- Separately support a process for developing new instrumentation
- Determine a normal, full, optimal operating year
- Set up standard rack, power, data hook-ups
- Establish protocols for expendables
- Develop sensors and expendables that can be adapted to a wider range of aircraft sizes
- Cost structures refined and defined so that users can write proposals
- Outline the mechanisms for requesting and getting scheduled on other aircraft
- Characterize the value of aircraft time, how do the costs compare to ships and satellites, and what do you get

What the SCOAR committee can do:

- Sent letter to Margaret Leinen about the need to have a mechanism for funding national oceanographic aircraft facilities
- Set up technical/operator coordinating groups
- Draft set of standard instrumentation and get community input
- Outreach: EOS, UNOLS news, booth, special sessions to get the word out
- Define and/or catalog methods and contacts for using other aircraft and set up MOU's as necessary
- Define and/or publicize procedures and policies for research clearances, airspace permissions, equipment installations, liability, etc.
- Draft an aircraft request form and procedures for requesting & scheduling CIRPAS Aircraft (see NASA form: https://asws.dfrc.nasa.gov/cgi-bin/airsci_flight_request/airsci_selector.pl)
- SCOAR could help NASA identify the role for Earth Sciences aircraft, UAV and instrumentation support. What are the requirements of the ocean science community?

NASA Report: Cheryl Yuhas

By 2008 the four aircraft operated by Earth Sciences will be operated by someone else or mothballed. In the interim, they will determine the long term need for continued operation of these aircraft and how they will be operated.

ESAC (Earth Science Advisory Committee) will be the starting point for evaluating the continued need for these aircraft.

There are some issues with competition. NASA cannot compete with commercial providers. Examining partnering with commercial companies and how that might work.

In 2008 the earth sciences division will divide up into three parts, one for utilization of existing aircraft that are known and ready to support their work, one third will be used to develop new aircraft operations, the third portion will fund suborbital science missions.

SCOAR could help identify the role for NASA earth science aircraft and UAV support in the future.

ONR Report: Carl Friehe

Aircraft funded through the facilities section at ONR. They use the old formula, where program pays 40% and Facilities pay 60% of the costs. There is also no formal mechanism for long-term maintenance and overhaul.

Ocean.US Report: Larry Atkinson

Ocean.US is overseeing the building of an operational ocean observing system.

Ocean Observatory Facility Needs: Scott Glenn

Aircraft needs for coastal observatories. Scott showed the way that the coastal observatory uses many different methods for deploying sensors and making observations including research vessels, AUVs, gliders, buoys, satellites, CODAR radar and aircraft. Aircraft were used primarily for hyperspectral surveys and salinity surveys.

Scott asked for input from SCOAR on other ways that aircraft could be used and how more aircraft operation centers could be established. The committee reviewed the draft report for the observatories working group on the need for aircraft facilities supporting coastal observatories. They provided input to Scott on revisions to that document. Recommendations and requirements for aircraft will be included in the working group report, which will come back to SCOAR through UNOLS and may require specific recommendations from SCOAR in the future.

Scott recommends that someone from SCOAR attend the CoOP steering committee meeting in November in Chicago and the ORION meeting in January.

Action List from February Meeting:

SCOAR Committee objectives and priorities

The meeting concluded with a discussion of the immediate and future objectives of SCOAR during which the following list of action items was developed:

Action items:

Immediately:

1. Determine who will attend OFAP and ICCAGRA meetings
Mike Prince to OFAP, no ICCAGRA meeting held.

2. Who goes to Coastal Observing system meetings?
Not determined, look at future meetings

Now:

1. Expand the content of the web page
Added minutes and agendas, added links to other aircraft operators, need more on requesting UNOLS aircraft.

2. Compile a coherent list of available aircraft facilities and make available
Started for Federal Agency aircraft.

3. Find out to what extent aircraft facilities have been used for ocean sciences
Not done yet, could make part of general questionnaire for ocean science community.

4. Ask users, operators and funding agencies
See above.

5. Consider the aircraft needs for observatory initiatives
Addressed to observatory work group, on the agenda for this meeting.

6. Help to define a basic payload for oceanographic research for the aircraft
Create initial outline and post.

7. Develop a flyer and notice regarding the need for new member and chair of SCOAR to send to UNOLS representatives
Did through EOS and with FOFC brochure.

Soon:

1. Develop aircraft request forms and develop scheduling/allocation process (Standardize! Require aircraft requests? CIRPAS mentors also deserve some consideration when scheduling)
Use UNOLS STR and NASA aircraft form as a guide.

2. Develop a method for a more effective funding mechanism with NSF, write letter to the Director of Geosciences.
Letter written and recently sent

3. Posters and models in UNOLS booth, EOS article, BAMs article, UNOLS news article. New Chair and members? Advertise with articles?
Ad for chair run in EOS. Outline article for EOS at this meeting. New members on agenda for this meeting.

4. Survey of facility and instrumentation requirements on UNOLS website.
Draft content of questionnaire at this meeting or by subgroup after meeting.

5. Check with FOFC about the Aircraft Facilities brochure and look into ICAP brochure
Done

6. Coordinate SCOAR meeting with ICCAGRA meeting in July
Participate in next meeting when scheduled.

Eventually:

1. Start to look at what other aircraft facilities could be designated as national facilities

UNOLS vessels are those United States research vessels:

- generally operated in support of national oceanographic research programs, by academic or other non-profit institutions
- are significantly funded by the federal government
- they are operated in accordance with UNOLS safety standards
- subject to regular, recognized ship inspection programs
- scheduled by established UNOLS procedures
- meet cruise reporting
- cruise assessment
- cost accounting and performance standards according to UNOLS uniform practices
- regularly available to users outside of the operator institution provided that funding is available from the sponsor of the research or from the user

Sub-committee of Charles Flagg, Ken Melville, Bob Bluth and Mike Prince to develop criteria and procedures for National Oceanographic Aircraft.

A national oceanographic research aircraft is

- generally operated in support of national oceanographic research programs, by academic or other non-profit institutions
- Significantly funded by the federal government.
- Operated in accordance with accepted safety standards and regulations
- Subject to regular, recognized aircraft inspection programs
- Scheduled by established procedures in line with UNOLS scheduling principals
- Provide utilization reports
- Provide a formal mechanism for user feedback and assessment of services provided
- Cost accounting and performance standards according to UNOLS accepted uniform practices.
- Regularly available to users outside of the operator institution provided that funding is available from the sponsor of the research or from the user

To make this happen:

- Provide up to date information on facilities, instrumentation and services available (web based)
- Utilize an online form for submitting requests to use the facility
- Engage in a formalized, published and open scheduling process that gives equal consideration to all legitimately funded research and education projects; publish schedules online
- Publish cruise planning procedures and operating procedures
- Publish a formal set of safety standards and get SCOAR/UNOLS Council acceptance.
- Develop a standard user fee structure based on cost accounting acceptable to the funding agencies; publish rate structure; ask funding agencies to treat aircraft facilities the same as UNOLS research vessel and submersible facilities for funding and proposal purposes.
- Develop a formalized mechanism for user and community feedback and input on services and facilities (SCOAR, post-deployment evaluation/assessment, etc.)
- Provide utilization reports/data to UNOLS to be used for assessing the need for aircraft facilities and to assess whether or not equal access is being provided

Outline of Basic Sensor/Measurement Packages:

- A/C Flight parameters
  - Position, altitude, time
    - GPS – WAAS, Differential GPS
    - Inertial Navigation System
  - Distance above surface (specify level of precision)
    - Radar altitude
    - Laser altimeter
  - Attitude, heading, TAS, speed and course over ground, rate of climb
- Flight level parameters
  - Air parameters
    - Temperature
    - Pressure
    - Humidity
    - Wind speed and direction (horizontal, vertical)
    - Wind turbulence
    - Liquid water
  - Aerosol and cloud physics
  - Trace gasses, CO_2, SO_2, others?
- Remotely sensed parameters
  - Solar radiation, incoming (through guest developer)
  - SST
  - Salinity
  - Visible imaging, digital video and frame grabbing
  - IR ocean surface imaging
  - Visible spectrometer and hyperspectral imaging
  - Wave height measurements
  - Bathymetry

- Mapping beach/dunes/coastal erosion
- Scanning RADAR
- Scanning LIDAR
- Air column
- Towed sensors
- Multiple sensors on tow body
- Deployed sensors
- Drop windsonde
- Remote sensors
- LIDAR (Doppler)
- In-water parameters (deployed sensors)
- AXBT, AXCTD, AXCP, AXKT, AX**, sonobuoys
- Argo floats and other floats
- Communications

EOS Article

- Introduction
- Aircraft support for ocean sciences
- Rational for designated national facility
- UNOLS NOAF – CIRPAS
- Plans for the future

Observatory Aircraft Requirements:

- Uses
- Long-term, continuous observations in areas where fixed instrumentation are not available
- “SWAT Team,” intensive activities (algal bloom, storms, etc.)
- Centers
- Alaska
- West Coast

- East Coast
- Gulf of Mexico
- A/C types
- Low, slow, good visibility - inshore/beach
- Light twin – continental shelf survey, remote sensing, deployables
- Long-range turboprop – longer duration or long-range surveys, remote sensing, deployables
- Remotely piloted aircraft – offshore, long duration surveys

Action Items

- Send someone to the ORION meeting for observatories to be held in San Juan Puerto Rico, Jan 4 – 8, 2004 http://www.coreocean.org/orion/
- CoOP steering committee meeting regarding Pioneer Array, coastal observatories. Rich Jahnke is chair of steering committee. Meeting scheduled for Chicago, Nov.12 & 13 (John Bane will contact Rick Jahnke)
- Draft requirements for a National Oceanographic Aircraft Operator and a definition of what that means. (Charlie Flagg, Ken Melville, Bob Bluth, Mike Prince)
- Outline and Draft EOS article (Dan Reimer, John Bane)
- Refine and present for community input a list of sensors and measurements that should be standard on oceanographic aircraft. (John Bane, Bob Bluth, …)
- Update the information available online regarding the facilities, instrumentation, procedures and methods for access regarding CIRPAS.
- Create a formalized set of NOAF safety standards.
- Create a formalized aircraft facility request form and scheduling process
- Compile a summary of current utilization and operations of aircraft support for ocean sciences
- New members, add names if needed, John will contact names on list to see if they are interested, get statement of interest and CV, circulate to committee, vote

Current Members

- John Bane – physical oceanography
- Charles Flagg – physical oceanography
- Dan Riemer – atmospheric chemistry
- Ken Melville – physical oceanography

Possible New Committee Members

- Vernon Asper – sedimentoligy
- Steve Ramp – NPS – physical oceanography
- Bill Plant – UW/APL – remote sensing, air-sea interaction
- Ron Smith – Yale – meteorology
- Brian Heikes – URI – atmospheric chemistry/oceanography
- Tony Clark – UW – aerosols, atmospheric chemistry