

**Scientific Committee for Oceanographic Aircraft Research (SCOAR)**  
Woods Hole Oceanographic Institution  
Woods Hole, MA  
**June 27-28, 2013**

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**Additional Meeting Related Material**

<a href="#">Stardate Supplement - Maritime Robotics - UAS Norway</a>
<a href="#">MITRE-TRITON - April 2013 TRB#4</a>
<a href="#">ScanEagle UAS Standard Operating Procedure - 10 May 2013</a>
<a href="#">SUS 4-11-13 MeetingMaterials2.pdf</a>
<a href="#">Mobile S-Band Phased Array</a>
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<a href="#">Guidelines For Incorporating New Assets Into the National Deep Submergence</a>

## Meeting Minutes:

### Day 1, Thursday, June 27th – WHOI, Redfield 204

**Welcome and Introduction – Daniel Schwartz**, SCOAR Chair, welcomed the participants to the meeting. Dan's flight to the East Coast was canceled, so he joined the meeting via WebEx. Meeting participants introduced themselves (at WHOI and on the web/teleconference). The Meeting Agenda is provided as **Appendix I** and the participant list is included as **Appendix II**.

**Welcome to WHOI** – David Fisichella welcomed the SCOAR meeting participants to WHOI.

### **UNOLS and Agency Reports:**

**UNOLS report** – Annette DeSilva provided the UNOLS Report. Details are included in her slides, **Appendix III**. Information about Fleet renewal efforts, fleet utilization, early career activities, and telepresence were covered.

### Discussion:

- There was a lot of interest in the telepresence capability.
- David Fisichella – Supporting the telepresence capability on Atlantis wasn't very difficult.
- Luc Lenain – It would be good to have the marine techs involved with outreach activities.
- Ro Bailey – She will be on the *Sikuliaq* ice trials in 2014 and there will be unmanned aircraft operations.

**ONR** – Tim Schnoor provided the report. He did not have slides.

- Although ship time is not increasing, we are getting to sea with new technologies.
- On the Navy side, the big ships have good schedules.
- *Knorr* and *Melville* will be retired in 2015 and will probably be offered for military sale.
- In recent years it has been demonstrated that the Global ships can support unmanned aircraft. He would love to see more of these types of operations in the future.
- ONR is working with Dwight Coleman at URI's Inner space Center to properly outfit the new Navy Ocean Class vessels so that they are constructed to handle the higher bandwidth needed for telepresence.
- Plans for mid-life refits of the three Navy Global class vessels, Atlantis, Thompson, and Revelle, are underway. If funds are available, the hope is to increase the life of these vessels to 45 years.
- Tim encouraged that there be a focus on the science that can be accomplished by using aircraft systems from ships. He hopes that Luc will discuss the science involved in the marine boundary layer project. Promoting the science is an important task.
- Tim said that he just visited SIO and looked at FLIP. FLIP is a useful platform and good surface boundary platform. He would like to promote airborne science use of platform.
- Tim was very pleased that NSF, NOAA, and USCG were able to participate in this meeting.

### Discussion:

- Luc Lenain stated that he has used FLIP and has plans to use it again with a quadrotor system.

- Phil McGillivray - There is interest in doing laser powering. This allows solar powering of unmanned aircraft. He would love to see a demo of this.

**NSF Division of Atmospheric and Geospace Sciences, Lower Atmosphere Observing Facilities –** Linnea Avallone joined the meeting via WebEx and provided the report for NSF. Her slides are included as **Appendix IV**.

- The current fleet includes a C130Q and Gulfstream which are owned by NSF run by UCAR.
- There are no NSF projects scheduled for the CIRPAS Twin Otter, but they have an MOA for its use.
- The NSF A10 Thunderhog aircraft is in the process of being de-militarized. It probably won't be operational until a year from now.
- Linnea reviewed the approved flight hours in FY13 and the approved and requested flight hours in FY14. There is quite a bit of demand. Some programs are still in review.
- NSF is supported some large programs including the Southeast Atmosphere Study (SAS), which is looking at mercury emissions and the Mesoscale Predictability Experiment (MPEX).

Discussion:

- Dan Schwartz - the programs that you have shown are atmospheric work. Is there any oceanographic work? Linnea - Not really. There is some tropical work, but no air-sea interactions research.
- David Fisichella - Do the trends for aircraft demand mirror the demand for ships? Linnea - they appear to stay level.

**NASA SUAS Operations –** No report.

**NOAA Aircraft Facilities and Operations –** No report.

**NOAA's UAS Program –** John Coffey (JC) provided the report. His presentation is included as **Appendix V**.

- JC reported that the two images in his slides are his favorites. On the right is the unmanned aircraft. The glider is lifted by balloon and then released. The platform only costs a couple hundred dollars.
- JC reported on NOAA's UAS Strategic Vision and Goals (see slides). UAS will revolutionize NOAA's observing strategies.
- NOAA UAS Program Analysis of Alternatives Recommendations are included in the slides.
- They would love to fly UAS into the eye of the hurricane and other places where you would not want to fly manned aircraft.
- NOAA partnered with NASA on the NASA Hurricane Severe Storm Sentinel (HS3) Experiment.
- The AV Puma is a ship capable system. It can land next to the ship. The vehicle has a two hour flight time and 2 pound payload. NOAA has been demonstrating these for the last couple of years. They are getting increased use.
- NOAA has been flying the MD4-100 for the last couple of weeks. They are using these with the PUMA for sea bird observations and the tsunami debris field evaluations. They have identified a lot of debris
- Environmental Monitoring of National Marine Sanctuaries is being done with PUMAs. They have also used SCAN Eagles and quadrotors for this type of work.
- Additional Animal Monitoring – In the past it was difficult to get images of the animals from manned aircraft because the animals would dive. The leopard sharks are so aggressive that it is difficult to

get close to.

- Small UAS Operations FY13. For the remainder of the year the small UAS will be quite busy.
- Next year they will be flying about 500 hours with mostly PUMAS, but also some quadrotors and some Scan Eagles. If anyone would like to participate in these exercises, give JC a call. The operations are challenging. The Puma has been very successful. JC is willing to share lessons learned.

#### Discussion:

- Phil McGillivray- there is a new 3-hour battery, gimballed cameras, etc. What are the potential for getting these? JC - There are a number of spirals in getting these. There are upgrades planned for the fall. They have partnered with UAF. UAF will provide and update the camera from 5mega Pixels to 24 mega-pixel. A lot of this work is being done with the Army. It has been very good working with the DoD on these upgrades.
- JC – There is also improvements to the precision landing capability. It is being updated and should be ready in the fall. GE is working with UAF.
- JC – Testing is being done on the ROM for atmospheric sensors. They are interested in having this on the Pumas. Rough order of Magnitude = ROM.
- Luc Lenain - Is there any follow-up using the Aerosonde for driving into the storms? JC - There are two air-launched systems that are still being pursued. They are trying to find funding for these.
- David Fisichella - There were a lot of land operations listed this year for NOAA. Is NOAA exempt from air space restrictions? JC - They either use military fields or they have COAs. They are also looking into acquiring state designation which is designated by the Department of State.
- Jim Hain - For the slides that showed whale observations, were marine mammal permits required? JC - All of these require permits and NOAA gets them. They work with the line offices to get these.

**Interagency Working Group on Facility Infrastructure – Subcommittee on Unmanned Systems (IWG-FI SUS) Activities** – John Coffey also provided the report for IWG-FI SUS. His slides are included as **Appendix VI**.

- They meet quarterly.
- Kim Curry retired.
- John Adler is one of the co-chairs.
- JC and Brenda worked on a SUS white paper and agenda. He will forward the white paper to Annette for posting on the SCOAR page.
- They are beginning work on an implementation plan.
- The next meeting will be in the summer. SCOAR members are welcome to join by phone.

**ICCAGRA** - JC also provided the ICCAGRA report. They met in April and most participants participated via teleconference due to travel restrictions. Some of the action items that they are addressing include:

- Charter review.
- Reach out to international partners.
- Encouraging people to update the aircraft and sensor status on the UCAR site.
- Defining observational requirements and capabilities to identify gaps.
- Due to increased collaborations with international partners, they are dealing with ITAR restrictions with the Dept of State.
- They are working on air space designations. There are spaces in the Arctic and the middle of ocean

where operations can be carried out.

## **Break**

### **Agency Reports – *continued***

**USCG Report and an Update on Raven and ScanEagle Operations** — Phil McGillivary provided the report. His slides are included as **Appendix VII**. Some of the areas covered included:

- NOAA UAS activities using PUMA. They are still going with the PUMA and MD-4, but not with the 24 mega-pixel cameras. JC - they have flown 2 PUMAs simultaneously
- CGC *Bertholf* had IR and other surveillance instrumentation. Dahlgren provided the ScanEagles.
- The CGC *Healy* Arctic deployment was discussed.
- The Marines are getting rid of AquaWasp.
- Data ingestion, geo-referencing, and archiving.
- Near term needs including legal concerns for Autonomous Technologies.

**CIRPAS Report - UNOLS National Oceanographic Aircraft Facility** – Bob Bluth provided the CIRPAS report via WebEx. His slides are included as **Appendix VIII**. His report included the following topics:

- The Predators have been replaced by Sentry. Sentry UAS are easier and cheaper to operate than the Predators. The Predators cost \$250K as a minimal. The Sentry systems ships easily and there are five of them. They have a green box payload.
- There were three CIRPAS flights this year
- CIRPAS still uses Camp Roberts for unmanned flights.
- Some of the military systems are being transitioned to civilian applications.
- The Smart Towed Vehicle can fly at 30 meters for ocean surface studies.
- New Instrumentation includes:
  - Stabilized radiometer platform – They tested this in the early spring. Post processing eliminates the aircraft influences.
  - Micro-sized air-launched expendable meteorological sensor and chaff
- The Storm Penetrating A-10 aircraft is currently on hold while the Air Force works out ownership issues. The aircraft is ready to fly.
- For ground based assets, CIRPAS has a new radar from the Army. It should be able to operate from sea as well. It should be able to track aircraft and weather at the same time.

Bob also discussed progress on the Neptune project. His slides are included as **Appendix IX**. The wiring harnesses have a defect and there will need to be some work done to resolve these issues. The benefits of the Neptune system are that it has a Navy IFC and it can launch and land in the water with a parachute.

### **Discussion:**

- Luc Lenain - Did you fly the Neptune at CIRPAS? Bob - They flew Neptune on the east coast and it went well.
- Phil McGillivary - If CIRPAS gets these, would they fly off-shore? What is the plan to use these? Bob - SCOAR input is needed here. It can be launched from ships. It would hve to fit into a model. It takes three to four people to operate, minimum.
- David Fisichella - One way to get this integrated is put it on the UNOLS request system. Annette - If Neptune gets added to CIRPAS, it can be added to the UNOLS STRS form.
- There was a lot of talk about having a UNOLS Booth for Ocean Sciences. Annette informed the

group that funds are not in the UNOLS budget to support a booth. A request for a SCOAR session at Ocean Sciences has been submitted.

### ***Lunch Break***

#### **The AGOR / UAS Scientific Demonstration Integration for Project DYNAMO and Manta Operations** – Luc Lenain provided the report. His slides are included as **Appendix X**.

- Luc reviewed the Project DYNAMO team.
- The location of the cruise was Papeete to Nuku Hiva, Tahiti cruise on took place on 4-22 Oct 2012.
- They demonstrated that UAVs can operate for long periods of time. One flight was 22 hours.
- A terrific data set was collected.
- This was a coordinated effort with other assets and researchers.
- Luc showed a video of a low level flight with launch and recovery and another video of recovery.
- Papers resulting from the Project are in the works.
- They were able to fly two craft simultaneously
- Another deployment is planned in July 2013 on *Knorr*.
- Luc - They didn't have a lot of variability in conditions as they would have expected. There wasn't much ducting. There are a lot of unknowns. On the *Knorr* cruise, they hope to see more fronts and diurnal.
- It is difficult to determine the actual cost of the UAS operations to make comparisons to manned systems. This was a very challenging operation and there were some costly logistics that had to be worked out.
- The only incident that they had during the cruise, was that they lost air speed on the UAS and lost PTow. They had to do an emergency landing. The PTow failure was sharp loss.
- Dan Schwartz – The project brought along six Scaneagles on the cruise. Did you also bring extra instrumentation? Luc - They had spare parts. They could put specific payloads on each of the Scaneagles and use them as desired.