Scientific Committee for Oceanographic Aircraft Research

United States Antarctic Program (USAP)
Approach to Approving UAS/UAV Operations
28-29 June 2016

Tim McGovern, Ocean Projects Manager
Division of Polar Programs, National Science Foundation
Members comprised of….

- NSF science/ship/station/air operations and environmental program managers
- Space and Naval Warfare Systems Command (weather and air traffic control)

- Department of Defense, Joint Task Force - Support Forces Antarctica
- Department of Interior, Office of Aviation Services
Chapter 4

- **4.1.4 Policy.** The National Science Foundation, Division of Polar Programs (PLR) shall establish procedures to ensure that all Antarctic UAS flights are properly approved and documented. PLR also shall ensure that UAS flight crews and operations receive direct oversight by SPAWAR’s Office of Polar Programs (SOPP) and the Department of the Interior’s Office of Aviation Services (OAS). Because UAS are aircraft, other forms of control, specific to aviation, apply to their employment. The most common are air control, airspace control, and air direction, which are exercised by aviation personnel and agencies.

- **4.1.5 UAS Command and Control Systems.** UAS Pilots in Command (PIC) must have the capability to command, control flight path / airspeed, coordinate, and manage the UAS. In addition, the UAS must independently have the capability to be remotely piloted and / or controlled. These systems include air control and airspace control as discussed below.

  - **4.1.5.1 Air Control.** Air control is the authority to direct the physical maneuvers of a UAS in flight or to direct a UAS to gather data or operate in a specific area.

  - **4.1.5.2 Airspace Control.** Airspace control provides for the coordination, integration, and regulation of the use of a defined airspace and identification of all airspace users. Any airborne object that may interfere with the flight path or trajectory of any other object within the USAP (and neighboring) airspace is of concern and requires airspace coordination and integration. Airspace control is the authority to direct the maneuvers of a UAS (along with other aircraft and airspace users) for the best use of the airspace. Airspace control is accomplished through established USAP procedures for coordination of airspace by ATC. Principles and procedures of airspace control used in manned flight operations apply to UAS operations. UAS capable of long-distance flight are normally routed through…..
-prepared by the COMNAP UAS Working Group

Purpose of this Handbook
The challenge for any national Antarctic programs that is beginning to utilize UAS technologies in the Antarctic Treaty region is to identify and manage risks associated with the technology and to develop guidelines that will regulate UAS use in differing circumstances in order to reduce or mitigate those risks. This handbook may be used to develop a process for UAS deployment in the Antarctic Treaty area.

The COMNAP UAS Handbook should be viewed as a living document which, as UAS technology evolves, and as published research on the use of and impacts, including environmental impacts, from UAS in Antarctica is made available and further developed in conjunction with SCAR and others, the recommendations and appendices are expected to evolve.
Other Guiding Documents

COMNAP UAS Manual – Decision Flow Chart

Refer to the sections of the COMNAP UAS Handbook (2016)

UAS activity type

- Recreational
- Science: Support / Operations / Logistics

Size/category of UAV

- Small / micro (less than 250g
- Medium (between 2-25kg)
- Large (greater than 25kg

Planned use type

Risk assessment: environment
- Appendix 1
- Risk assessment: safety
- Appendix 1

EIA

Area without other air operations taking place

Operations planning

- Appendices 2 and 3

Post-flight

- Appendices 4, 5 and 6

Do not proceed

Proceed

Do not proceed

Proceed

Reporting, record keeping, sharing information

Activity in area where other air operations are taking place.
Current Ship-based Ops

Review Process

- Science Program Manager must support use of UAV under scientific merit and/or outreach efforts
- AFSRB Chair provides grantees with sample Concept of Operations (CONOPS) document
- Once submitted, the AFSRB reviews, provides comments and additional guidance/requirements.
- Documents are also provided to USAP staff, including vessel master for comment.
- Additional notes and/or requirements are included in the Conditional Letter of Approval

NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230

24 March, 2016

Earlier this week the UAS Airworthiness and Flight Safety Review Board (AFSRB) completed its review of your UAS ship operations proposal for the NBF cruise. I am pleased to report that, with some conditions, your proposal was approved.

Your UAS proposal is approved provided that:

1. You review the Lessons Learned document from the UAS operation conducted off the NB Palmer using a DJI Phantom 2.
2. You follow manufacturer’s guidance re the recharging of the LiPO battery inherent in your UAS systems. LiPO batteries as a class have a reputation for catching fire during the recharging phase. At a minimum, the batteries should be placed in a fire resistant...
Review/Acceptance

- CONOPS and Conditional Letter of Approval (CLOA) are provided to USAP Staff for implementation.
- Failure to adhere to any requirements in CONOPS or CLOA are grounds for immediate halting of all UAS operations.

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1. You review the Lessons Learned document from the UAS operation conducted off the NB Palmer using a DJI Phantom 2.
2. You follow manufacturer's guidance on recharging the LiPO battery inherent in your UAS systems. LiPO batteries are a class with a reputation for catching fire during the recharging phase. At a minimum, the batteries should be placed in a fire resistant container while being charged. Recharging of the batteries must also be conducted in accordance with vessel policies.
3. The air vehicles will be maintained and operated in accordance with all manufacturer provided guidelines, manuals, latest firmware updates, etc.
4. You conduct all your UAS operations in accordance with NBP's standard flight operations procedures and Vessel SOP.
5. If you plan to release any aerial footage obtained via UAS during this cruise to the
Current Ship-based Ops

- NSF Media personnel are engaged for any video or still images intended to be released to public.
Current Ship-based Ops

- At the end of each cruise, we ask the PI/UAS Operator to provide a Lessons Learned document.
- Assists NSF in improving UAS planning and operations.
### Review Process

- Internally, we do a Risk Assessment that looks at a range of potential hazards.
- > distance from McMurdo = lower perceived risk

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<thead>
<tr>
<th>Hazard</th>
<th>Event</th>
<th>As Described in ConOps</th>
<th>Recommended Controls</th>
<th>Residual With Controls in Place</th>
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<td>Collision with manned aircraft</td>
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<tr>
<td>Injury to person(s) on vessel</td>
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<td>Recharging LiPO batteries</td>
<td>Injury to flight crew</td>
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Primary Concerns

- Safety of personnel
  - On the ship, on shore
- Safety to the environment
- Operator Training Levels
Recently established rules and guidelines will be reviewed and incorporated as appropriate.
Questions?