

**UNOLS SCOAR Report: Status Update &
Recommendations**
UAS inclusion into UNOLS Ship Operations

Report to RVOC April 2013

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Chair

*Scientific Committee for Oceanographic
Aircraft Research*

UAS inclusion into Ship Operations

Ongoing SCOAR working issues:

- 1) Regulations by FAA for UAS ops / Airspace
- 2) Information on UAS ops off ships
- 3) UAS inclusion into ship ops: Information on UAS technology and status of way forward
- 4) Conclusions and tasking for SCOAR/UNOLS: recommendations and priorities

UAS inclusion into ship ops:

Upcoming UNOLS UAS ops off ships:

- 1) @May 2013 ONR/DoD ScanEagle ops off *KNORR*.
- 2) *SIKULIAQ*, UAF Quadrotor UAS ops, @March 2014 ops in ice, for ice recon
- 3) Navy AGOR vessels (*NEIL ARMSTRONG* and *SALLY RIDE*) at WHOI and SIO: future UAS integration
- 4) *HEALY* dedicated 6-day UAS cruise Aug. 15-21, 2013 (assuming no cruise cancellation due to sequestration) involving NOAA PUMA and USCG R&D Center personnel off N. Slope

UAS inclusion into ship ops: UAS technology & status of way forward

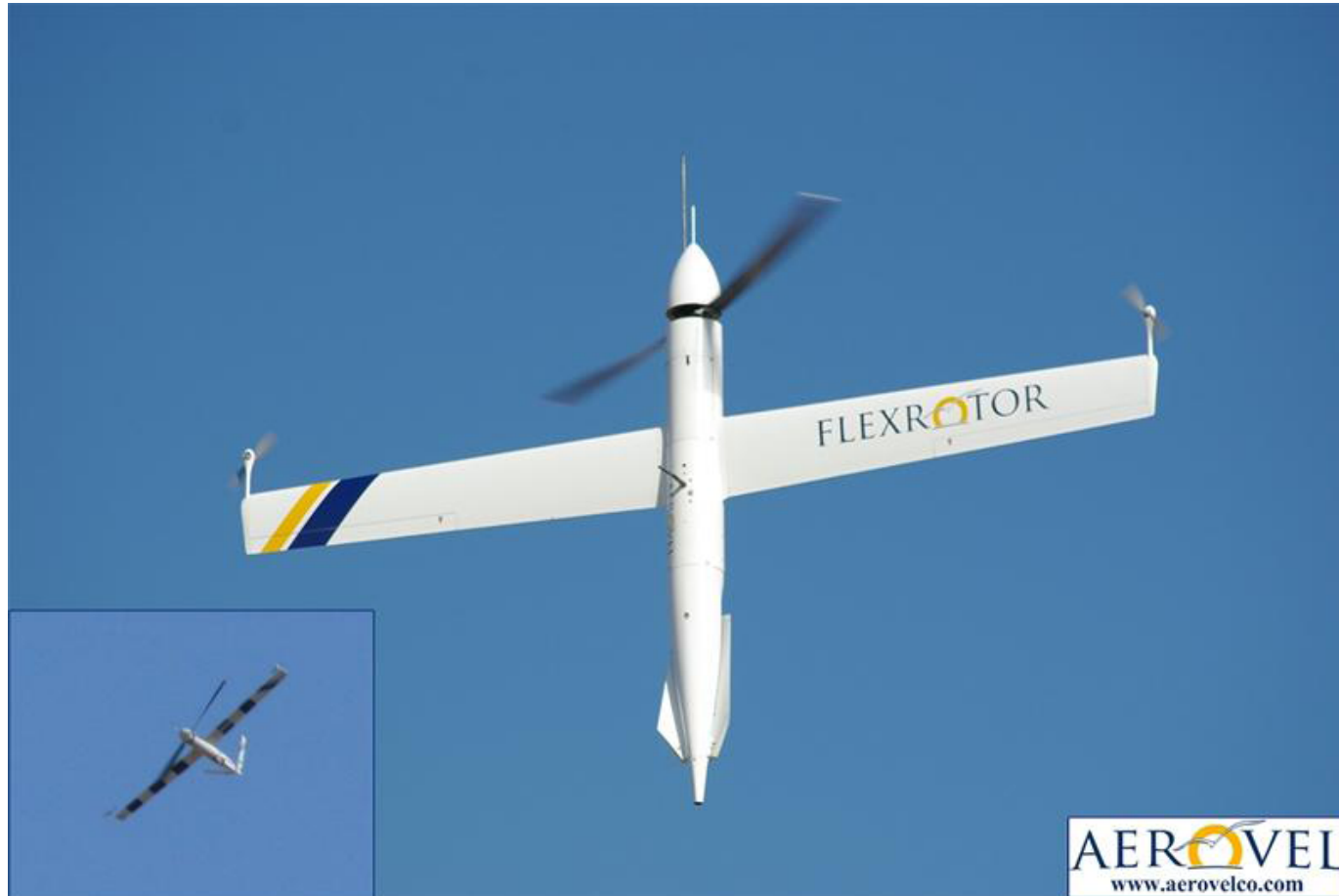
Key issues for UAS ops off UNOLS vessels are threefold:

- 1) Launch & Recovery Systems
- 2) UAS Video data ingestion, geo-referencing, archiving, and computer & bridge integration, and 'searchability': including issue of computer systems to accomplish this
- 3) Technology/Sensor development & integration with OOS and other research (eg Ocean Acidification, marine mammal studies, ocean color studies, air-sea flux, and integration with AUVs & ASVs & OOS)

UAS inclusion into ship ops:
Examples of other UAS systems:
Aeryon Scout Quadrotor UAS



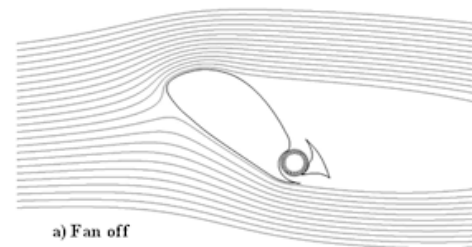
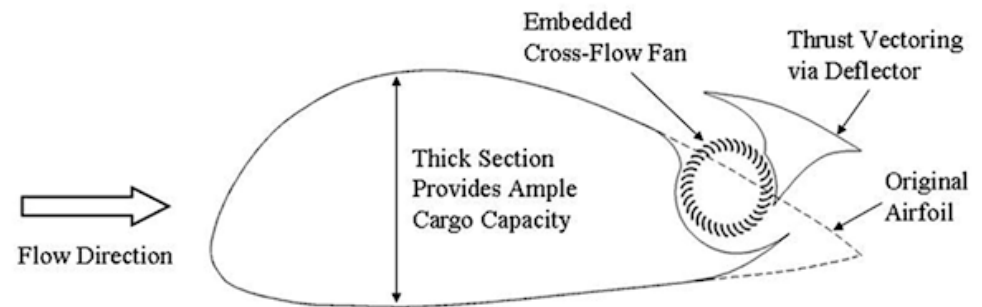
Aerovel Flexrotor: takes off & land vertically (LARS resembles a horizontal 'comb' w 'slots' for landing, transitions to horizontal, ONR contract, May 2012:
<http://www.aerovelco.com/Flexrotor.html>



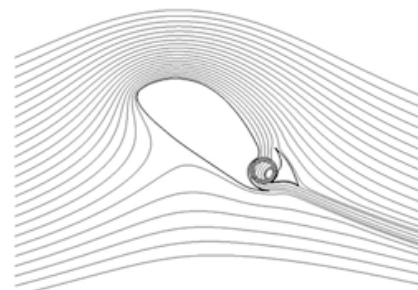
NOAA PUMA air-hydraulic launch, water landing...
advantage: if you don't make ship deck, you don't
lose the UAS, and it's certified for MilOps;
disadvantage: ship time, and small boat ops



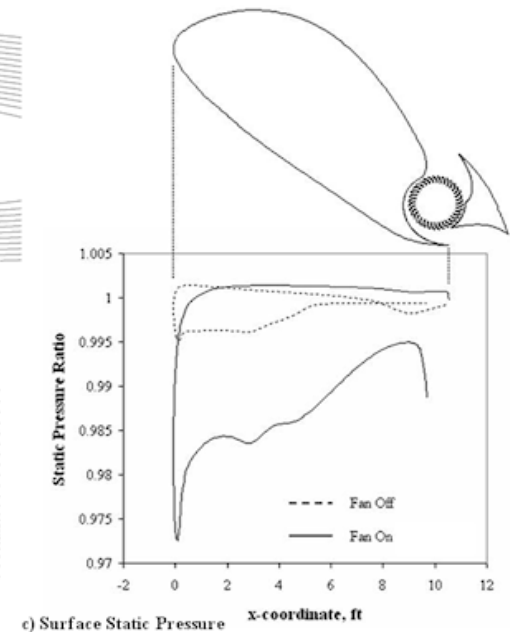
Propulsive Wing...great payload, easy launch (no high G hydraulic takeoff, near-vertical) , stalls to land on deck-
turn fan off



a) Fan off



b) Fan on



Shipboard net recovery, note very flexible nets



UAS technology & status of way forward:

- UAS Technology is VERY rapidly evolving, do NOT assume technology today is technology of tomorrow!
- battery developments already allow UAS to remain aloft at least 40 hrs. New battery technologies in existence NOW will increase endurance/range when applied to UAS
- UAS sensor systems are rapidly shrinking, also increasing range/endurance
- Goal will be to keep UAS aloft WITHOUT (or with minimal) deck landings. This IS achievable in near future.
- Hi-altitude persistent UAS are being tested now; will interface w ship-based or shore-based UAS. These will be very important when integrated with future ship-based missions.

Conclusions and 'way ahead' for SCOAR: recommendations and priorities

- 1) Need to convene workshop on ship video ingestion (whether from AUVs or UAS)
- 2) Write a new chapter (appendix) for the RVSS regarding "best practices" and safety requirements for operating UAS from UNOLS Ships. Work on this is being spearheaded by Steve Hartz and Ro Bailey at UAF, with help from Phil McGillivray (USCG) and Dan Schwartz. A Draft for RVOC Safety Committee review and input hopefully will be ready this summer.