

14:15-15:00

Incorporating a drone into the tech tool kit

Andrew Woogen

Oregon State University



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Oregon State University Marine Technician Group

WHAT WE'VE DONE WITH UAS'S THE PAST ~COUPLE YEARS

- *PROCURED UAS'S TO SUPPORT SCIENCE OBJECTIVES ON THE R/V OCEANUS*
- *HOSTED A UAS TRAINING EVENT AT THE OSU MTG FACILITY*
- *OBTAINED PART 107 CERTIFICATIONS VIA THE FAA FOR ALL OSU MARTECH'S*
- *UTILIZED UAS'S TO SUPPORT PUBLIC OUTREACH*
- *DEVELOPED OSU MTG SPECIFIC US DOCUMENTATION (JSA/SOP)*



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Training

- Part 107 training with General Pacific to receive certification.
 - A 2-day “cram” course with a guaranteed Part 107 test pass.
 - Learning how to operate drone
- Continued pilot training and system familiarization within team

- Other drone training available
 - Drone piloting class 101
 - 3D Point Cloud Mapping
 - o Asset Monitoring
 - o Corona
 - o External Load / Longline / Line Pulls
 - o LiDAR
 - o Multispectral Imaging
 - o Photogrammetry
 - o Surveillance / Asset Protection
 - o Thermography
 - o Videography / Photography



https://www.genpacdrones.com/wp-content/uploads/2019/08/PL-pp28-29-August-2019_CMYK-539x390.jpg

To learn more about available opportunities go to:
nwdroneacademy.com



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Part 107 certification

What is 14 CFR Part 107?

- ▶ Effective August 29th, 2016, 14 CFR Part 107 (or simply "Part 107") defines rules for operating a UAS for commercial purposes. Anyone that wishes to operate their UAS for commercial work must first receive certification by either;
- ▶ 1) Holding a current pilot's license (other than a student license) and passing an online test or;
- ▶ 2) Pass an FAA Knowledge Test, be over 16 years of age, and pass a TSA vetting process.



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Oceanus UAS JSA (job safety analysis)

Documentation



DRONE FLIGHT OPERATIONS

OSU SHIP OPERATIONS

Originator: Kate Kouba		Approved By: Andrew Woogen	
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Job Safety Analysis

Task to Be Accomplished: **Deployment and Recovery of Drone in Flight**

Potential Hazards:

- Projectile from broken propeller
- Entanglement of drone in ships equipment
- Loss sight of drone
- Wave and swell action enhance potential for hazards
- Wind effects within proximity of the ship
- Personal Injury when performing hand launch / landing
- Battery failure
- Experiencing external distractions or interruptions may enhance potential hazards
- Lack of adequate communication may enhance potential hazards
- Line or cable in water being caught in the propulsion system
- Deploying or recovering before everyone is notified and ready, particularly the bridge officer
- Personnel falling overboard while working near deck edge

Engineering and Administrative Controls: (Note: The following is not a comprehensive list of engineering controls available. Controls listed serve simply as a reminder that you should properly use items that may be on hand to mitigate potential hazards)

- ✓ Familiarity with the SMM sections "Overboarding Operations"
- ✓ Properly trained pilot in command (POC) with part 107
- ✓ Properly trained personnel on deck
- ✓ Properly submitting NOTAM prior to flight



DRONE FLIGHT OPERATIONS

OSU SHIP OPERATIONS

Originator:		Approved By:	
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- ✓ Clear and proper communications between everyone involved
- ✓ Good housekeeping on deck
- ✓ Situational awareness
- ✓ Only personnel directly involved in operation will be in the work area.

Environmental Concerns:

- Loss of Drone at sea
- Loss of Li Batteries

Environmental Controls:

- ✓ Maintaining adequate battery levels for flight and return
- ✓ Maintaining visual on drone when in flight
- ✓ Ensure positive control of all components as they are brought on board.

Personal Protective Equipment: (Note: Some items may or may not be required depending on the situation, company policy, etc.)

- Eye Protection
- Hard Hat
- PFD
- Safety shoes
- Work clothing appropriate for outside deck work



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SOP (standard operating procedure) and vehicle specific user manual

Includes:

- Flight planning
- How to submit a NOTOM (*notice to airmen, which is required if operating in controlled airspace*)
- piloting instructions specific to each vehicle
- How to operate the vehicle's controls
- Tips and techniques for piloting
- Account usernames and passwords
- Video editing instructions
- Where to find help if needed



https://financio.co/blog/wp-content/uploads/2018/04/sop-standard-operating-procedure-699357482_706x499.jpeg



Drone resources at OSU

- COA (OSU is now moving away from this and is pushing for all OSU UAS pilots to just get their own part 107's)
- Drone Compiler app (A great resource to logging flight data, and used to be required when OSU provided the COA)
- UAS training at University for students and employees
- OSU has its own UAS policies depending on how they're being used
- OSU will register our drones with the FAA for us (and make sure we stay current)



DRONE COMPLIER



<https://img.evbc.com/https%3A%2F%2Fcdn.evbc.com%2Fimages%2F64923083%2F182232571677%2F1%2Foriginal.20190705-144552&w=1000&auto=compress&rect=0%2C0%2C2880%2C1440&s=d812ffb607d8e85348845b68e0b4773>



https://static1.squarespace.com/static/589e20c91970ea0415f0e930/58ad159617bffc503f305bb6/5d89fb22ca49b978bf9a8d10/1569324321406/65948044_1462738540534122_7688605863501627392_o.jpg?format=1500w



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COA

What is a COA?

A Certificate of Authorization or Waiver (COA) is a document that: when submitted by a person or group wishing to operate UAS for commercial or public uses in the national airspace (NAS), **provides the legal framework for said operations.**

Specified in the COA are your standard operating procedures (SOPs), emergency procedures, the applicable flying location(s), and any other requirements needed for safe NAS operation.



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Register an OSU MTG vehicle with the FAA

How do I register my UAS?

- ▶ An FAA N-Number is granted to aircraft that are successfully registered with the FAA. **The N-Number must be displayed on the aircraft and accessible without the use of tools.** As a public entity OSU is required to register all of its unmanned aerial vehicles before flying them. In addition, **OSU aircraft must also be registered with Oregon Department of Aviation (ODA).**
- ▶ **To register your aircraft begin by sending the make, model, serial number, and billing index to drones@oregonstate.edu.** Your aircraft will be registered using the FAA's online system and you will receive confirmation with your registration number when it's approved. **FAA registrations cost \$5 and last two years, ODA registrations are \$25 per year.**



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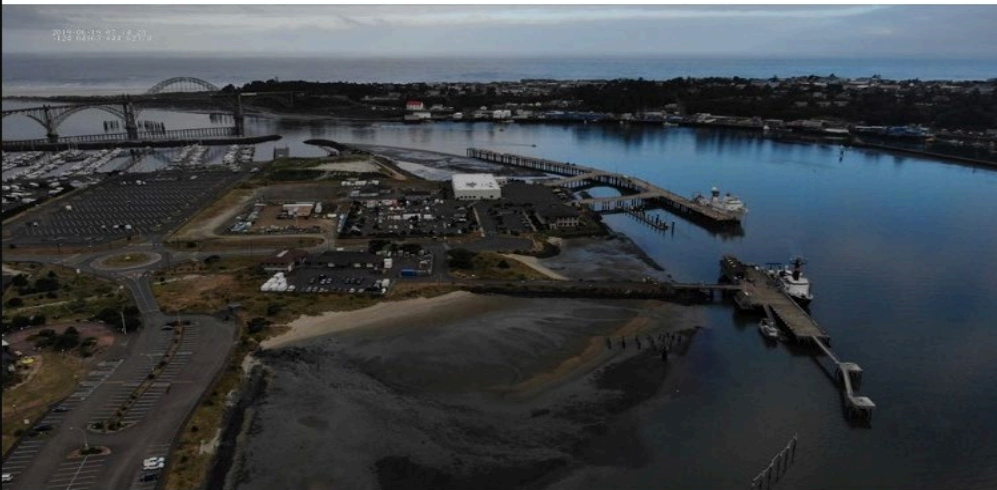
OSU MTG UAS Publicity in our College



College of Earth, Ocean, and Atmospheric Sciences - Oregon State University

8 hrs · 🌐

Photo Finish Friday (not a thing; we just made it up): great aerial view of Ship Ops, NOAA MOC-P, Yaquina Bay Bridge, and beyond, taken with the OSU Marine Technician Group's aerial drone.



👍 16

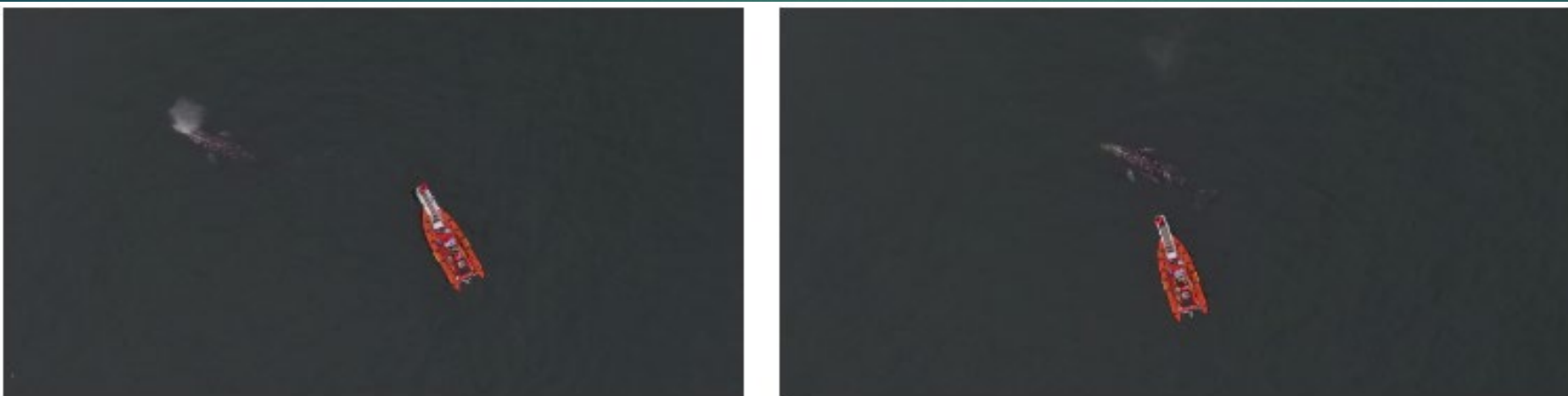


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OSU MTG drone science uses on Oceanus

Tracy Crews cruise September 2019. UAS utilized to video whales. The OSU scientist's whom has a marine mammal permit to fly drones over whales part 107 cert lapsed (*needs to be renewed every 24-months*). But because the OSU MarTech supporting her cruise has his current part 107, this allowed her to still do her UAS ops to support her science mission objectives.

Jim Moum – two cruises 2018 & 2019. UAS utilized to view a R&D vehicle being towed off the starboard side as well as to look at waves over the horizon. Jim told us that he's utilized the video collected on his 2018 cruise many times during his presentations to ONR.



Credit: Leigh Torres

**NOAA/NMFS research
permit #21678**



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Taken during Oceanus's NSF/JMS 2019 inspection - OSU Ship Operations facility



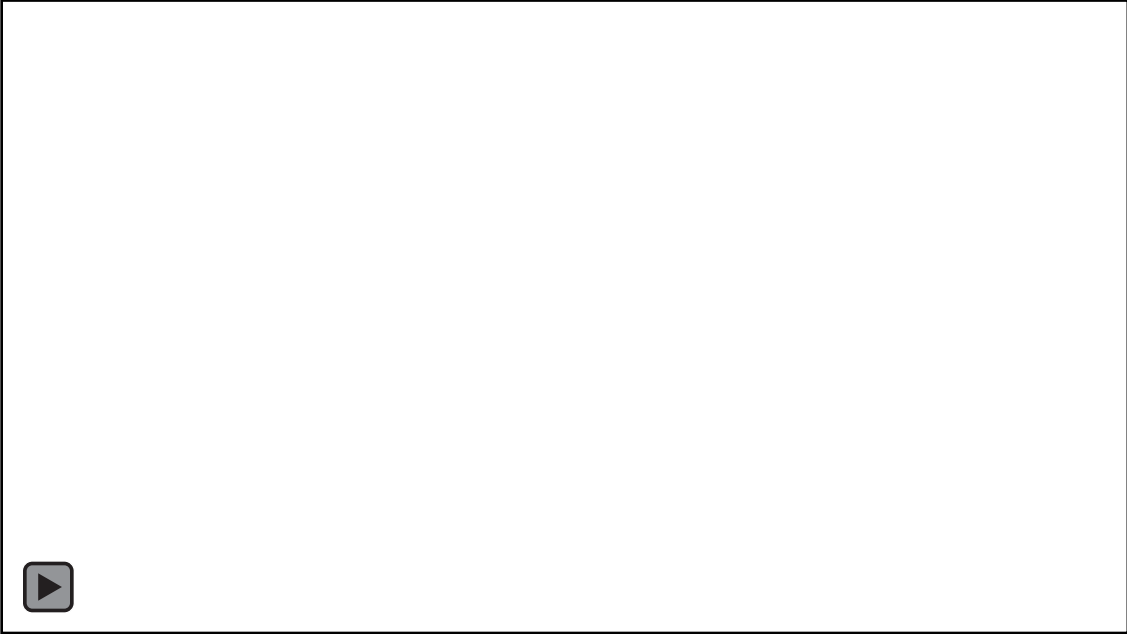
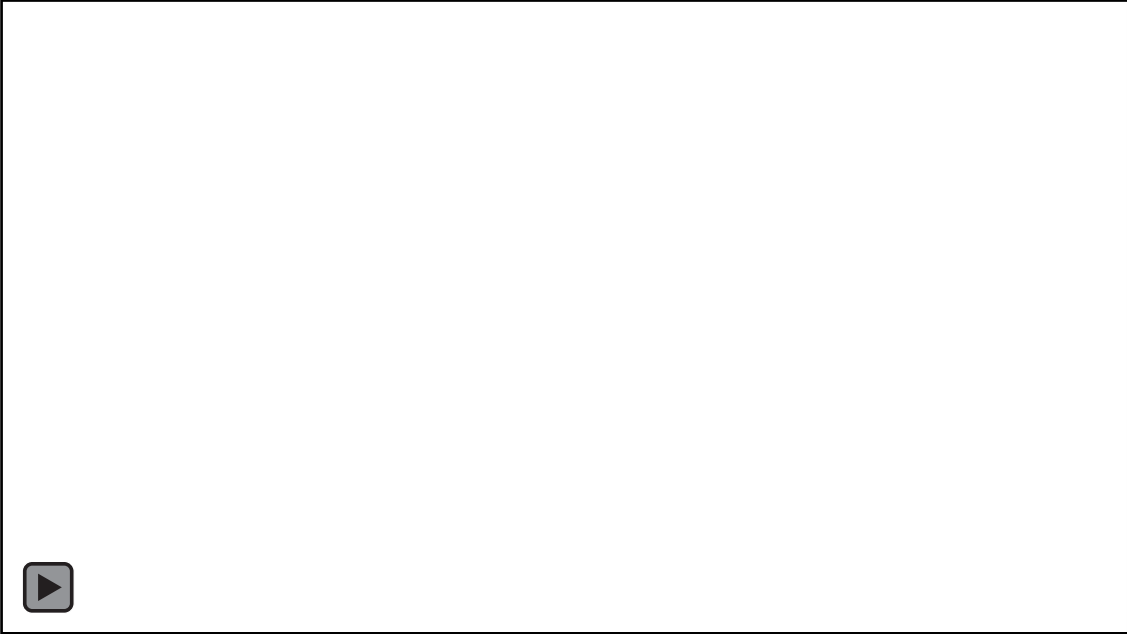
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First drone flight off Oceanus Vehicle = Splash Pro



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Grey Whale Research with Drones



NOAA/NMFS research permit
#21678



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OSU MTG public outreach with drones



Photo of the Week



Marine Technician Kristin Beem presenting at a public outreach event hosted by the Oregon State CEOAS Marine Technician Group in their Corvallis workshop. Photo by Andrew Woogen

Send Announcements (and photos!)

[Email your submissions](#) to *On the Horizon*.



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OSU MTG Pilot Training – how to land a UAS on a moving ship (catch it?)



Pictured left to right:
OSU's Marine Technicians
Kate Kouba and Kristin Beem



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Leigh Torres recovering her drone

NOAA/NMFS research
permit #21678



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Best Practices for Capturing

- When using drone footage with other action cams its best to standardize:
- Frame rate
- Field of View
- Resolution
- Audio (if used)



Editing

- Adobe Premiere Pro
 - Wide range of functions from assembling easy shorts to complex training videos
- Final Cut Pro
 - Similar to Premiere Pro but for MacOS
- iMovie
 - Pre-generated templates and music, which may cause issues when it comes to creditation.



Audio

There are a lot of sites that offer music for distribution. Most only ask that you credit the artist in the end credits. It is important to make sure the music you use is “open source” or has lapses its “intellectual property rights”

- ▶ YouTube audio library – made just for this purpose.
- ▶ PacDV – sound effects and sound bites.

There are some important terms you should understand before you use audio or other digital assets that you did not create on your own



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- **Public Domain** – Works in the public domain are those whose intellectual property rights have expired, have been forfeited, or are inapplicable.
- **Copyright** – A legal right created by the law of a country that grants the creator of an original work exclusive rights to its use and distribution, usually for a limited time, with the intention of enabling the creator (e.g. the photographer of a photograph or the author of a book) to receive compensation for their intellectual effort.
- **Royalty Free** – The right to use copyrighted material or intellectual property without the need to pay royalties or license fees for each “use” or per volume sold, or some time period of use or sales.
- **Creative Commons** – These licenses allow creators to communicate which rights they reserve, and which rights they waive for the benefit of recipients or other creators.
- **Fair Use** – A limitation and exception to the exclusive right granted by copyright law to the author of a creative work.



OSU MTG's UAS Mavic2 Enterprise Dual Drone



Features include:

- 4K video gimbal
- FLIR thermal camera
- Daylight readable display/controller
- Strobe light for dusk/dawn flights
- Spotlight
- Floats (full warranty, so as long as the vehicle can be recovered at sea it'll be replaced)
- Protective case and spare batteries/parts



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Future of UAS's with the OSU MTG

- ▶ Anticipate more use cases identified by the science community and our vehicles will be requested to support mission ops on Oceanus cruises
- ▶ Continued training on UAS piloting and operating off a moving ship
- ▶ Explore new payloads (*sensors?*)
- ▶ Consider investing in spare equipment
- ▶ Renew part 107 certs every 24 months for all OSU MarTech's
- ▶ Establish clear expectations of UAS services MarTechs will provide to the ship-using science community



Future of UAS's in UNOLS – *potential*

- ▶ Consider a center for excellence – one MarTech Group could spearhead this innovation to provide a service to the science community as needed. Potentially funding as a specialize service.
- ▶ Consider group training for UNOLS MarTechs, to economically and efficiently train MarTechs in UAS's and get them part 107 certified
- ▶ Consider establishing a fleet-wide COA for UAS operations in the MarTech community. Which could include a set of requirements (ex. Training/vehicle registration/flight data recoding/mission ops pre-approval...)
- ▶ Establish clear expectations of UAS services MarTechs will provide to the ship-using science community

