UAS Applications for Spill Detection and Response

Jessica Garron

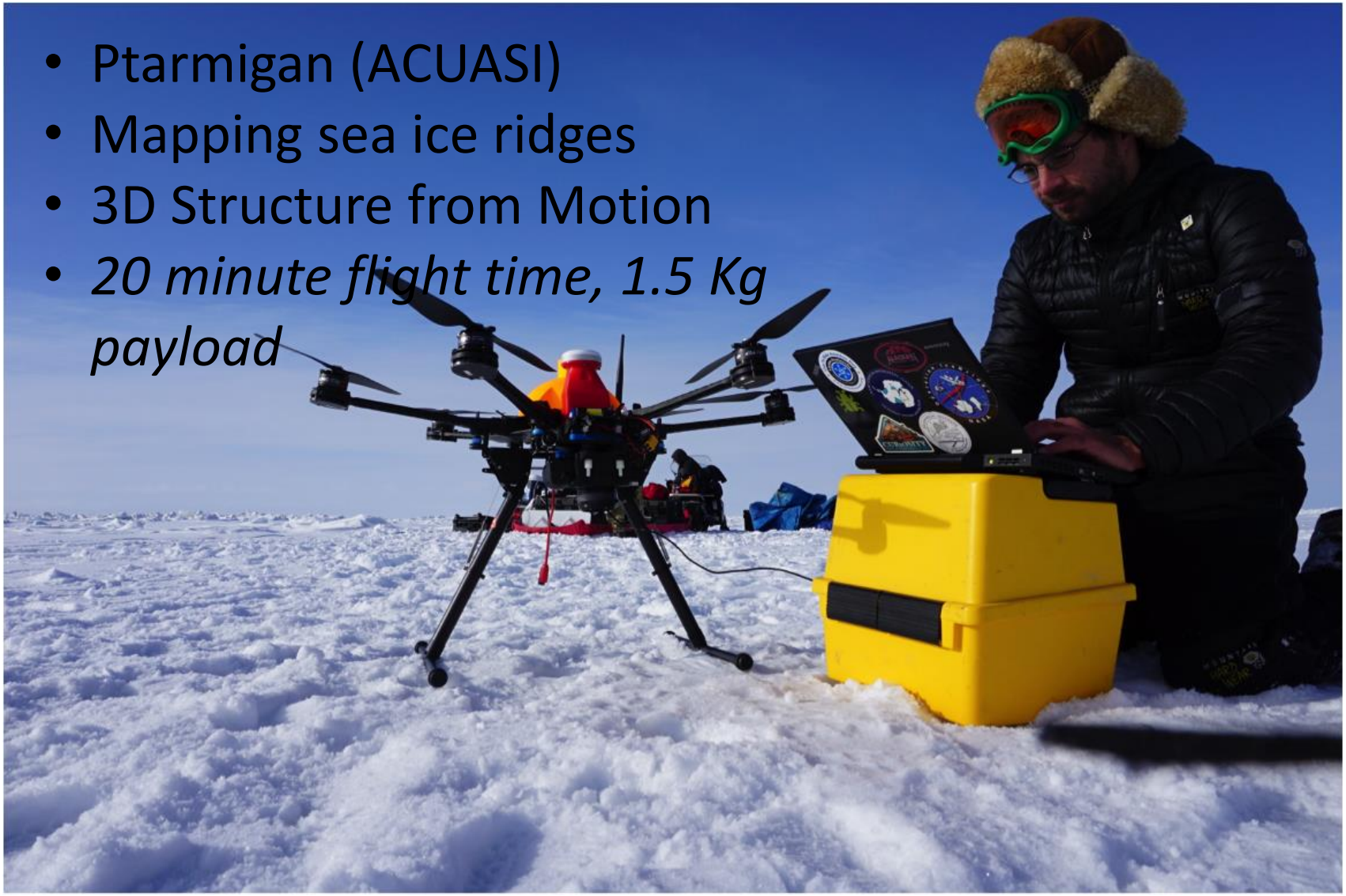
Sr. Science Consultant

University of Alaska Fairbanks

Current UAS Applications in Spill Detection and Response

- Aerial observations
  - Infrastructure inspection
    - Pipelines, flare stacks, roads
  - Mapping (2D/3D)
    - Oil, vegetation, sea ice, sensitive assets
  - Situational awareness
- Aerial response
  - Herder application
  - Igniter application
  - (dispersant application)
  - (Buoy deployment)
  - (water sampling)
  - Wildlife management

Aerial Observations

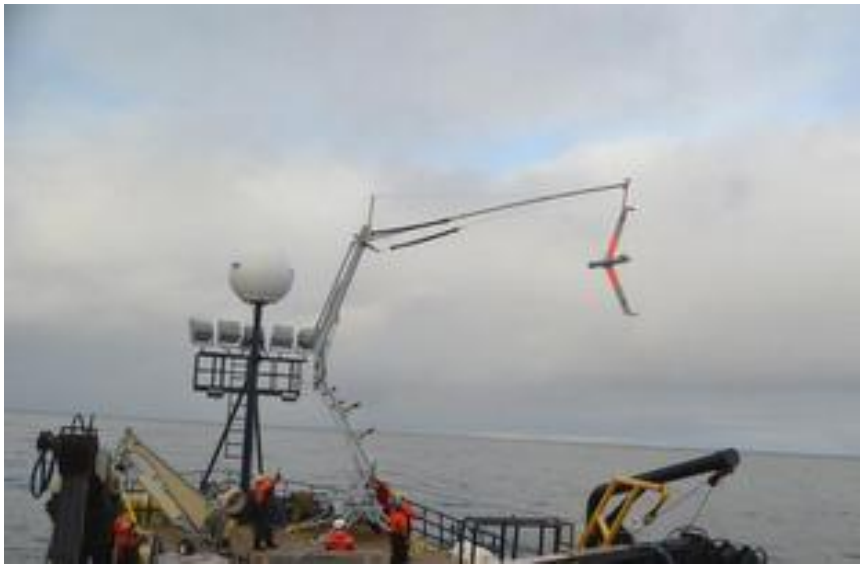


Aerial Observations

Aeryon Scout (Aeryon Labs)

- 2013 ENI oil spill containment drill off Oliktok Point
  - Drill observation/analysis with EO and IR camera
- Pipeline inspections; *20 minute flight time*

Aerial Observations



ScanEagle® (InSitu Inc.)

- First approved commercial use of a UAS in U.S. (ConnocoPhillips)
  - Communications/COP integration testing
  - Live stream video from UAV to ground
  - 120 miles off the coast of Wainwirght, AK
  - Ship deck launch over Chukchi Sea
- *60-80 kts cruise/dash, up to 24 hrs flight time, ~3 Kg payload*

Aerial Observations

SeaHunter (Griffon Aerospace)

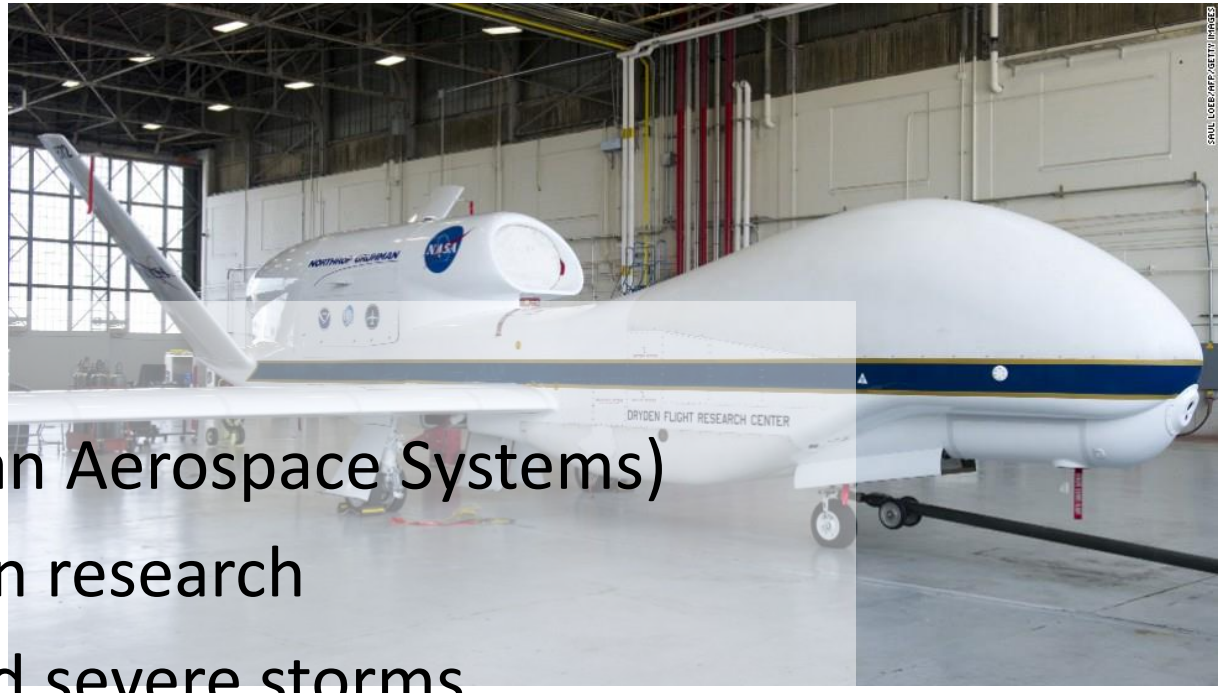
- 1500 m take-off/landing requirement
- Dual engine, 7-11 gallons fuel capacity
- *5-7 hr flight time, 100 lb payload capacity*

Aerial Observations

Sprite © (Ascent AeroSystems)

- Situational awareness
- 13.2 inches x 3.8 inches, 2.6 lbs.
  - battery and standard camera
  - GoPro compatible
- *6 Km range, speed up to 10 m/sec, 2 Km LOS communications, 10-12 minutes flight time*

Aerial Observations



NASA Global Hawk

(Northrup Grumman Aerospace Systems)

- Earth observation research
  - hurricanes and severe storms
- 116 foot wingspan
- *Rolls Royce turbofan engine, 8500 nautical-mile range, 24-hour endurance, satellite and LOS communication, 1500 lb payload capacity*

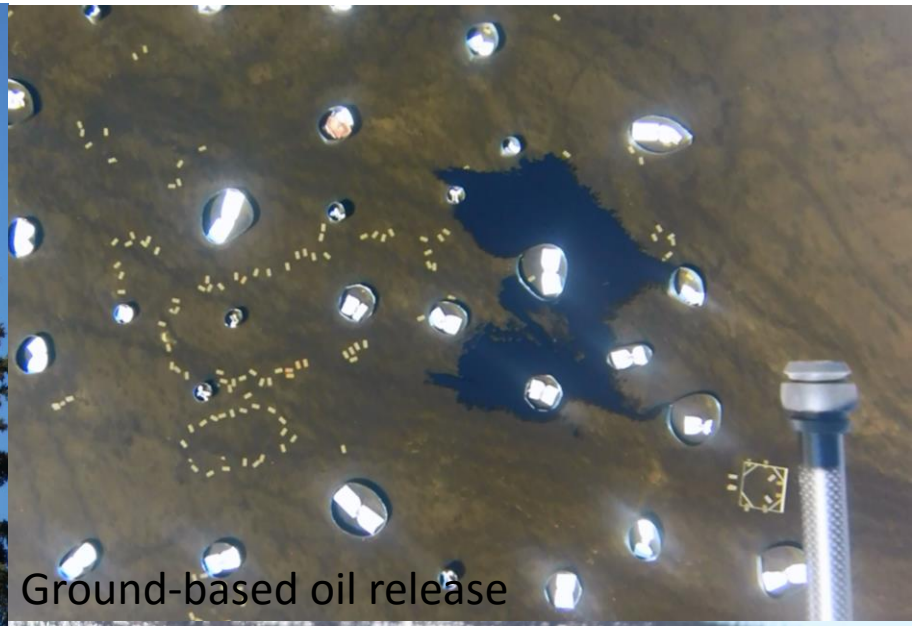
Aerial Response

Responder (ING Robotic Aviation)

- Herder application around an oil spill
- Ignition of herded slick with marine flare
- *10 Km radio LOS control, 30-40 minute flight time, ~3 Kg payload capacity*

Aerial Response


Aerial application of fire


Ground-based oil release


Measurable efficiencies


Aerial application of herder

Aerial Response

RMAX (Yamaha Motor Corp.)

- FAA approval for pesticide and fertilizer application
- University of California, Davis' Oakville Station test vineyard in Oakville, Calif.
- 207 pounds

Aerial Response

- Electric company maintenance workers in Xiangyang, China
- Photo by Wang Hu/VCG

Wildlife Management

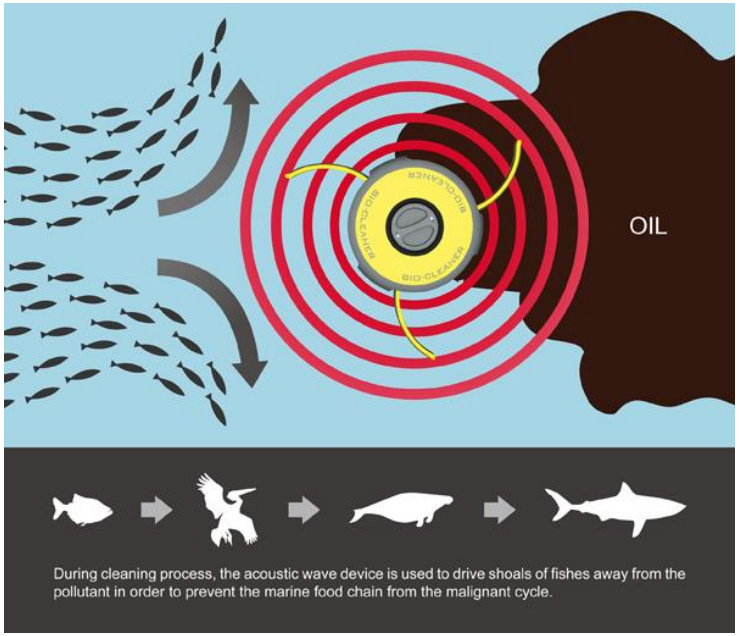
RoBird (Clear Flight Solutions)

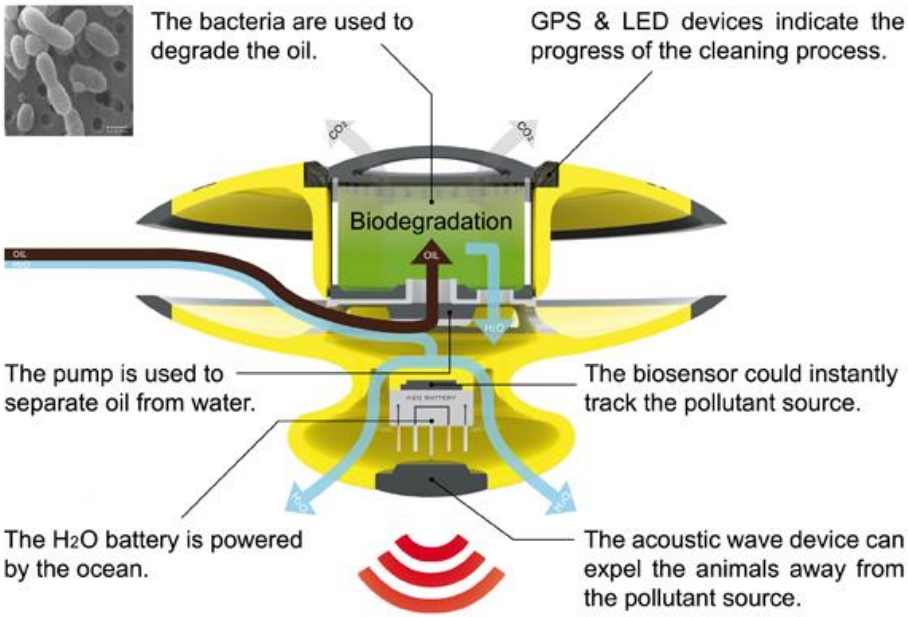
- UAVs decorated to mimic birds of prey
- Hazing
  - response and drills
- NOT FOR SALE

Aerial and Surface Response

Bio-Cleaner (Designed by Hsu Sean)

- Rumba-like
- Biosensor technology to track oil
- Oil bidegrading bacteria on-board
- Transmits high frequency acoustic waves

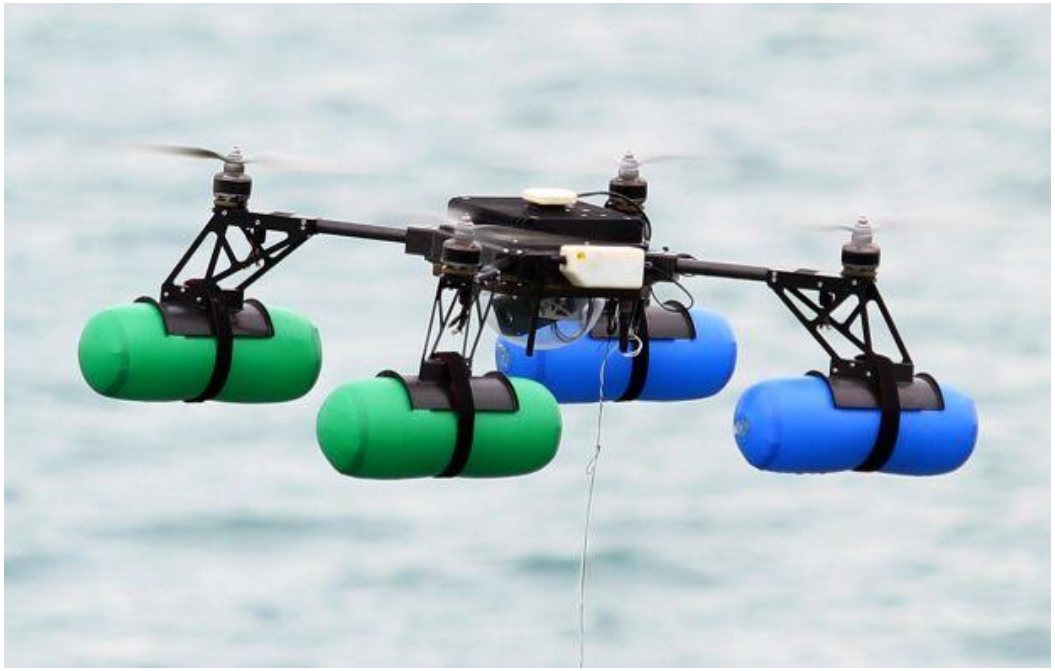




Aerial Observations *and Sampling (?)*

Water Spider (Maritime Port Authority of Singapore and Hope Technik)

- Waterproof, launch/land on water surface
- EO camera and TIR
- *150 m LOS, can fly in up to 20 knots*



UAS Implementation Limitations

- FAA regulations
- Airspace management
- Payload capacity
- Flight times
- Communications
- Data management

UAF Test Basin at Poker Flat Research Range

- FAA test site
- Prototype testing
- Subarctic/Arctic conditions
- Training opportunities
- Remote sensor scalability testing
- Collaborative opportunities

2016 Alaska Oil Spill Technology Symposium


Thank You
Jessica Garron
Jigarron@Alaska.edu
907-474-7598

Herder Burner Footage