

Woods Hole Oceanographic Institution

UAS Activities

David Fisichella

- The ability to conduct UAS missions has provided WHOI with collaborative research opportunities - USGS/WHOI Cooperative agreement.
- WHOI continues to focus on small, commercially available UAS platforms.
- WHOI's experience with UAS technology has lead to development of unmanned surface vehicles - Autonomous JetYak

sUAV (Small Unmanned Aerial Vehicle) Aerial Mapping of Coastal Landforms

Peter Traykovski, Katie Samuelson & Sophie Pesek

Applied Ocean Physics & Engineering, Woods Hole Oceanographic Institution



Image from

7/15/2015

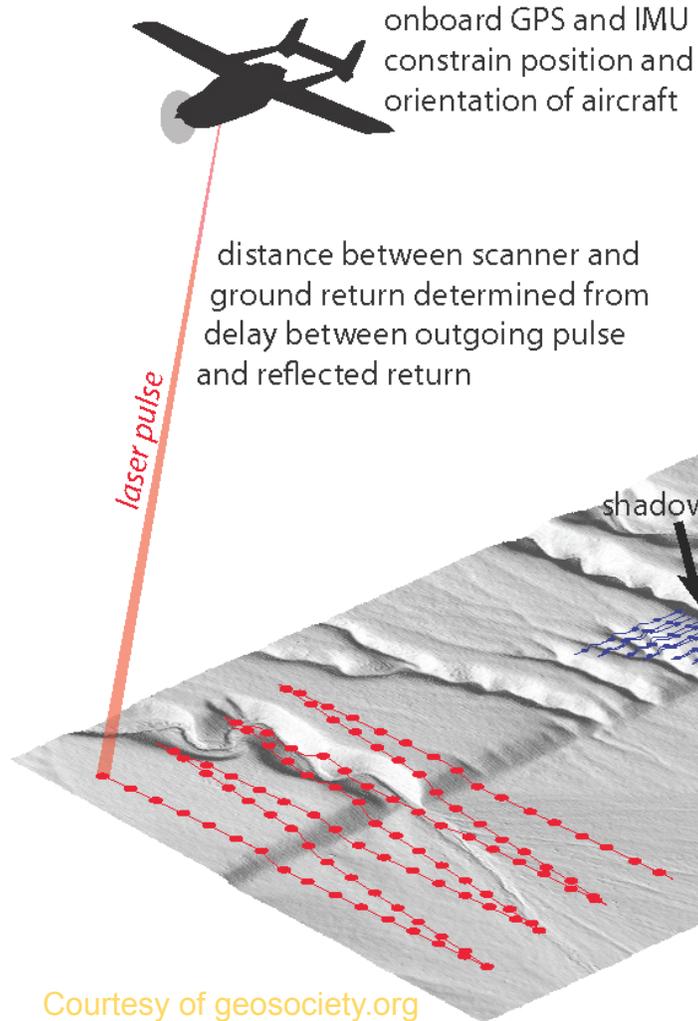
Mapping Techniques

Typically by Feds, NOAA etc, 5-10 year repeat
Covers Huge Areas Quickly

**DJI Phantom 3
Non-fisheye
lens**

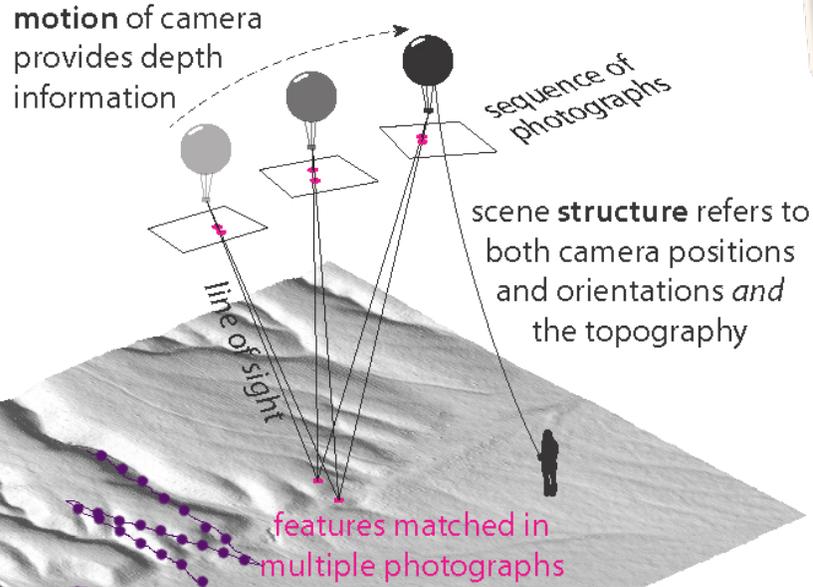


Airborne Lidar



UAV Structure from Motion

Rapid Coverage of $\sim 1-5 \text{ km}^2$, Anyone can do it!



GPS Backpack

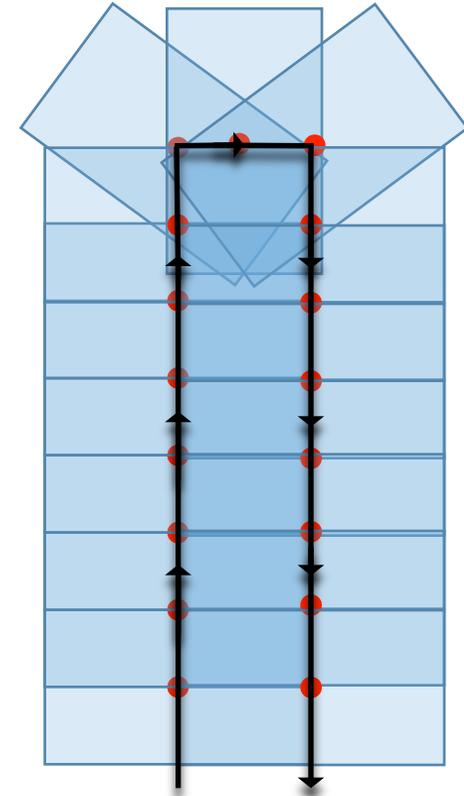
Slow single line
Vertical Requires Survey Grade
GPS

Terrestrial Lidar

Very Detailed, but limited Range.
Ideal for dynamic scenes

Flight Pattern

Any given point has 5
views

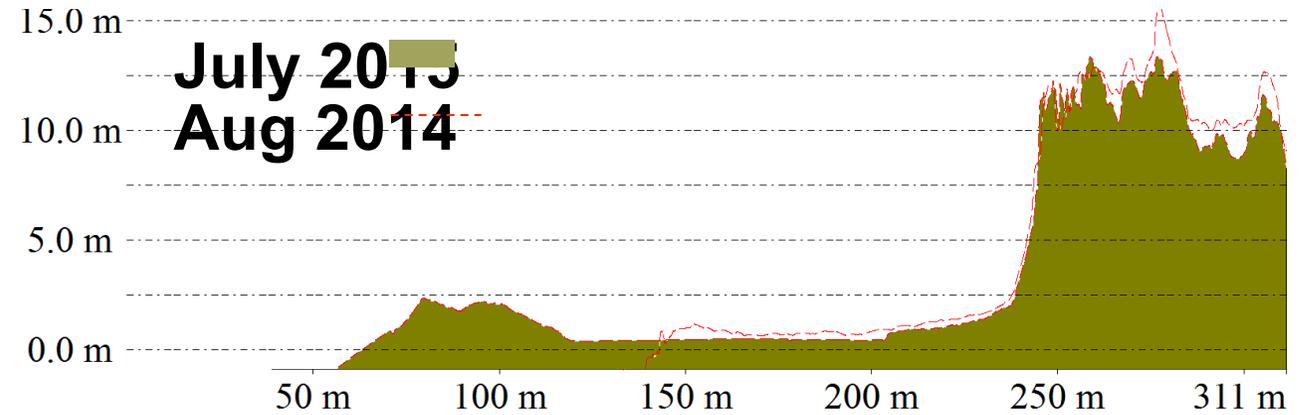


Aug 2014 to July 2015 Change

Aug 2014

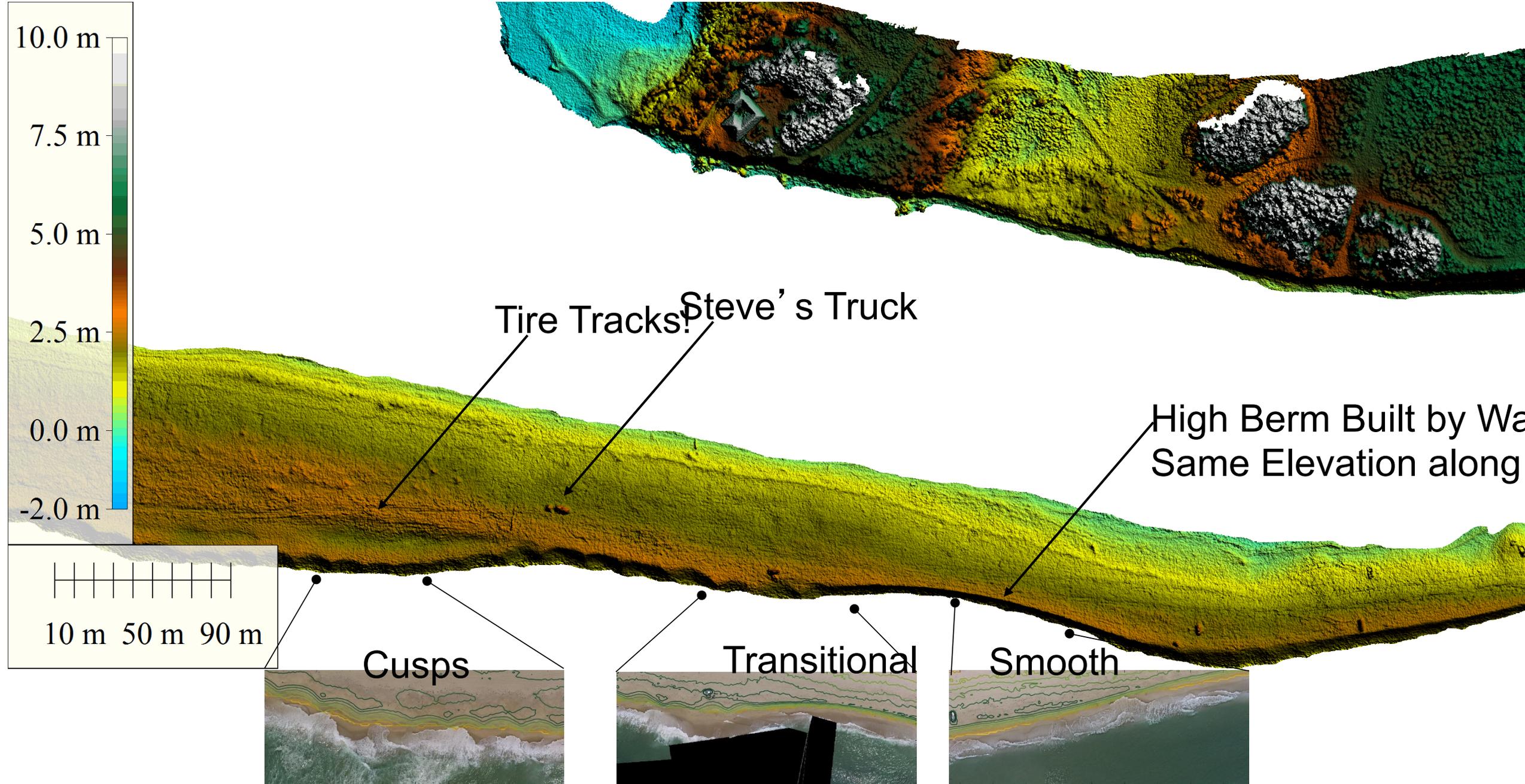


July 2015



- sUAV SFM produces topographic maps suitable for measuring sand volume changes in subaerial regions
- Need bathymetry for areas that were underwater in either survey

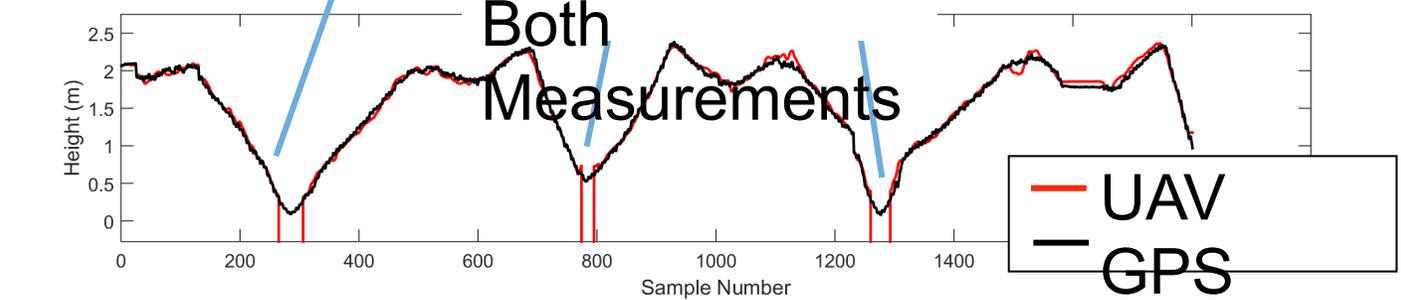
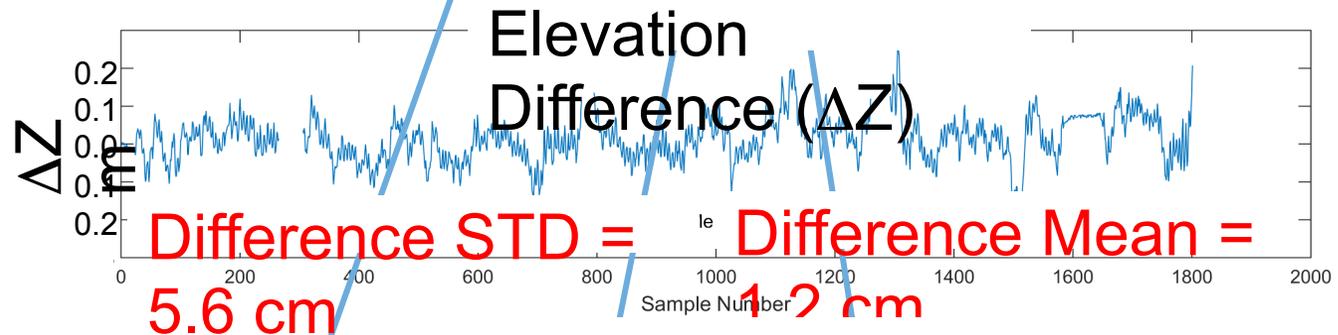
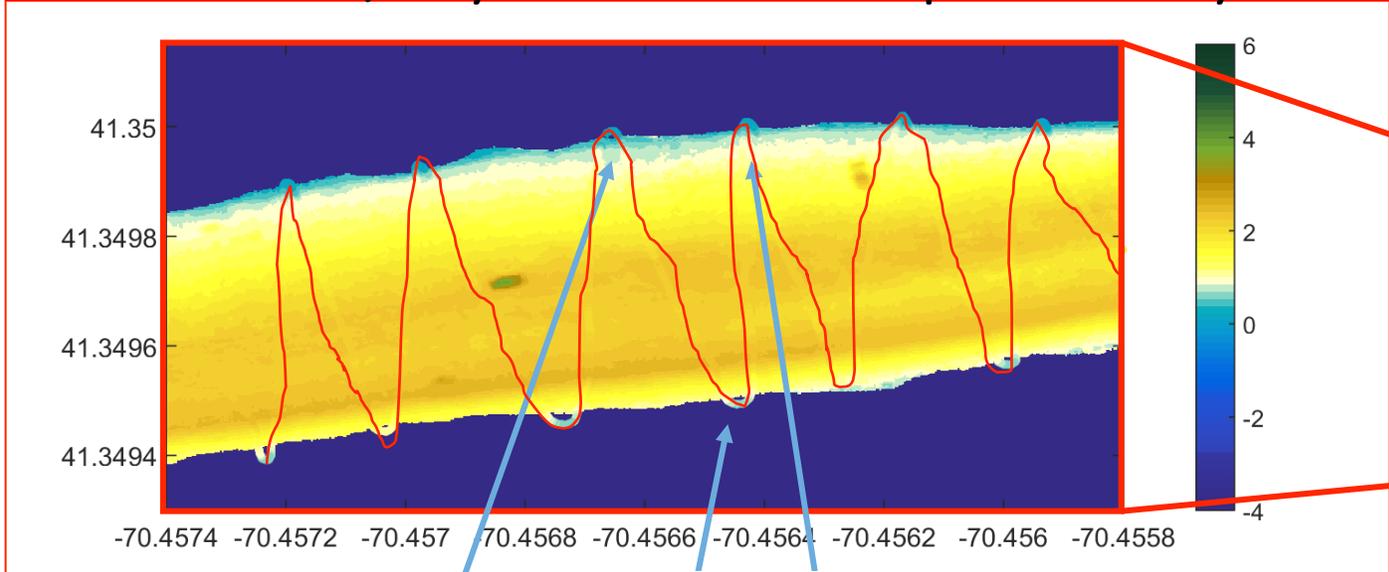
Norton Point, July 2015 Topography



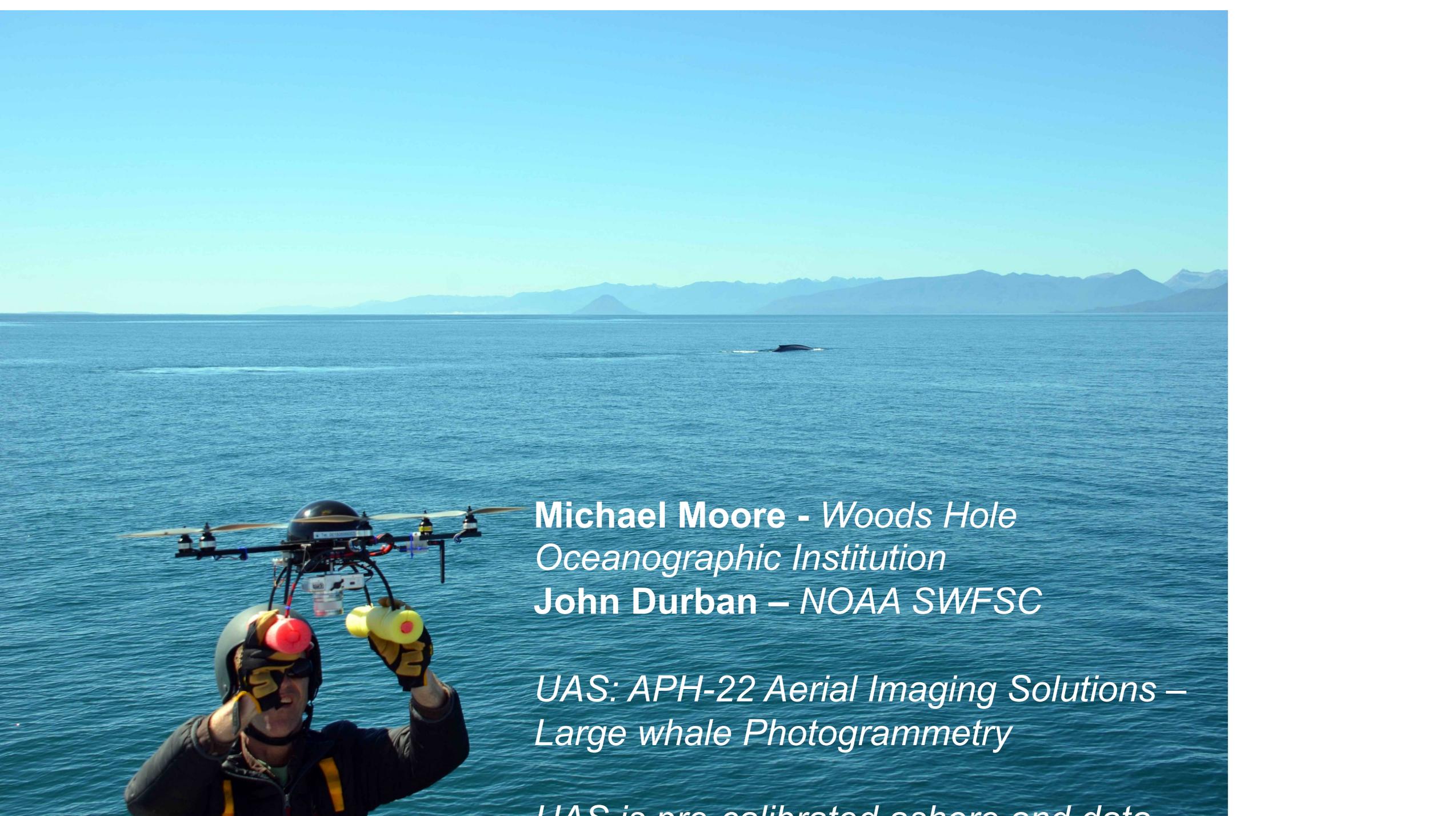
How Well Does it Work?

Norton Point, July 2015: GPS Backpack Survey vs. Multicopter SFM*

*with GPS GCPS



Works Really Well!!!



**Michael Moore - Woods Hole
Oceanographic Institution
John Durban – NOAA SWFSC**

*UAS: APH-22 Aerial Imaging Solutions –
Large whale Photogrammetry*

UAS is pre-calibrated offshore and data



North Atlantic right whale – Subsurface skim feeding

Cape Cod Bay 03/16

Vertical image of entire body enables length and width measurements, given



North Atlantic right whale (b) compared to a Southern right whale (SRW - a) in similar stage of lactation in Peninsula Valdez, Argentina. Note markedly greater body width in the SRW. (SRW image credit: Iain Kerr and Carolyn Miller.)

a) Permit Sub Secretaría de Conservación y Areas Protegidas #095-SsCyAP/15 Permit Dirección de Fauna y Flora Silvestres #65/2015 DFyFS. b) NOAA Permit #17355, FAA 333 Exemption #12618

WHOI Autonomous Surface Vehicle - JetYak



Mission Planner 1.2.69 mav 1.0

FLIGHT DATA FLIGHT PLAN INITIAL SETUP CONFIG/TUNING SIMULATION TERMINAL HELP DONATE

Distance: 1.6545 km
Prev: 545.60 m
Home: 309.57 m

Waypoints

| WP Radius | Loiter Radius | Default Alt | Absolute Alt | RTL@Ref Alt | Verify Height | Add Below | | | | | |
|-----------|---------------|-------------|--------------|-------------|---------------|------------|-----|---|----|------|------|
| 13 | WAYPOINT | 0 | 0 | 0 | 41.3795940 | 72.3593062 | 100 | X | Up | Down | Grad |
| 14 | WAYPOINT | 0 | 0 | 0 | 41.3794813 | 72.3593473 | 100 | X | Up | Down | Grad |

Mouse Location
Lat: 41.38023450
Long: 72.3543369
Alt: 20
GoogleSatellite
Status: loaded files
Read WPs
Write WPs
Home Location
Lat: 41.3801312
Long: 72.3567616
Alt (ft): 2