# *U.S. Navy Marine Species Monitoring Program*

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***Please visit the US Navy Marine Species Monitoring Program web portal for additional information on this project – [www.navymarinespeciesmonitoring.us](http://www.navymarinespeciesmonitoring.us)***

*US Navy Marine Species Monitoring Program – Atlantic Technical Review Meeting*
*Virginia Beach, VA* *11-12 April 2017*

# DMON-glider integration demonstration and evaluation

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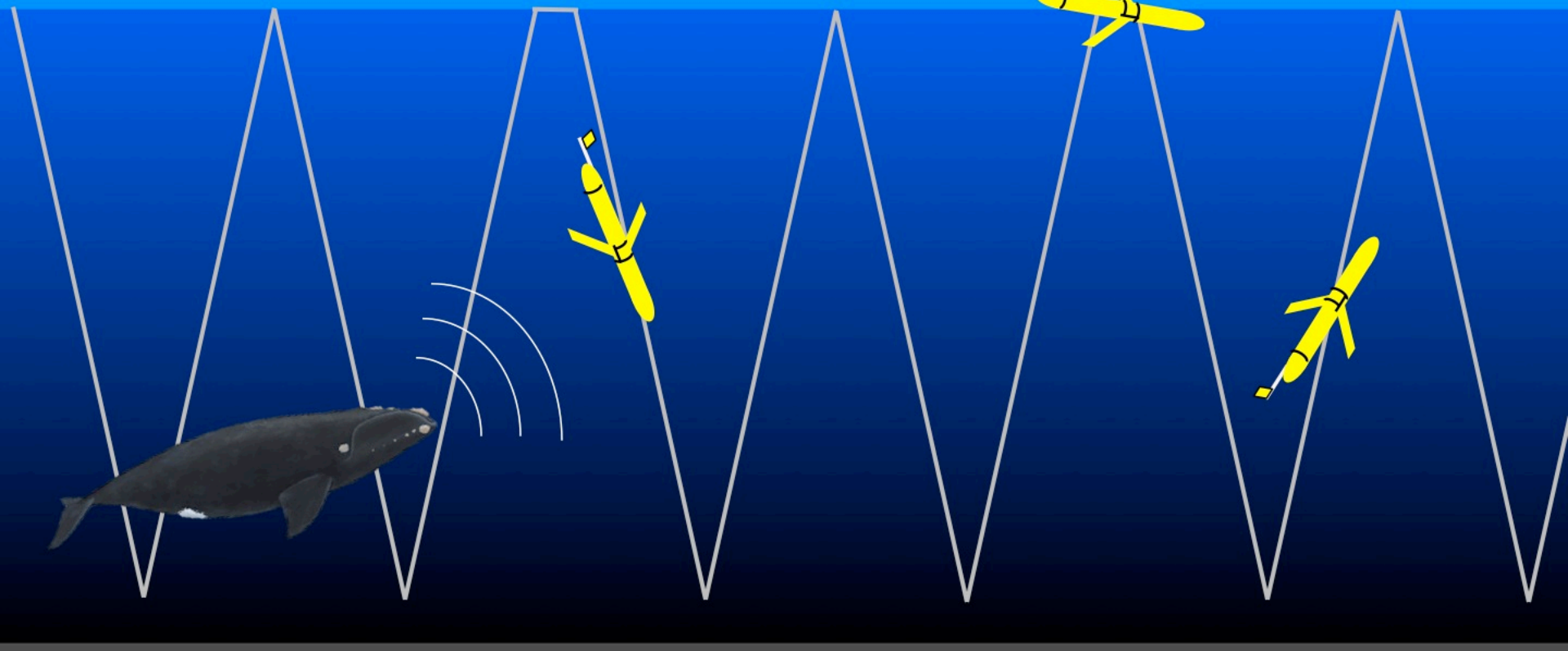
*[1] NAVFAC Atlantic, [2] NOAA NEFSC, [3] Woods Hole Oceanographic Institution*



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Pitched idea of NAVO taking on near real-time detection as a service to NAVFAC to support marine mammal monitoring mission

Much to my surprise, they were extremely enthusiastic!

# History

December 2015 – initial meeting

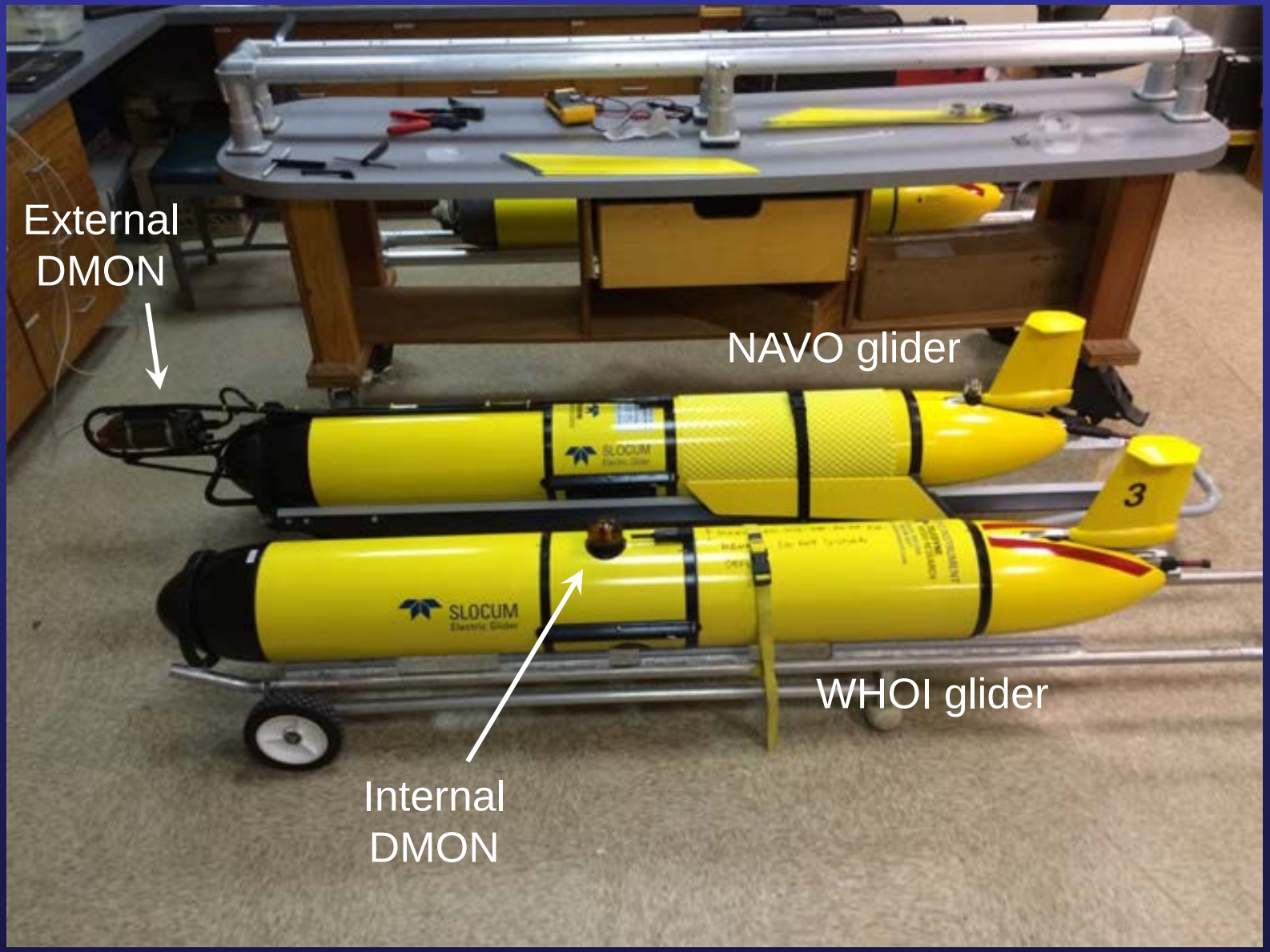
January 2016 – Slocum glider manufacturer modified glider firmware to encrypt DMON detection data

February 2016 – Visit to Stennis to (1) install DMON on NAVO glider, (2) meet and greet with NAVO and NAVFAC personnel

March 2016 – Ship glider to WHOI and NAVO engineer visits WHOI for final checkout of glider

March 30, 2016 – NAVO and WHOI gliders deployed together

# NAVO and WHOI Slocum gliders



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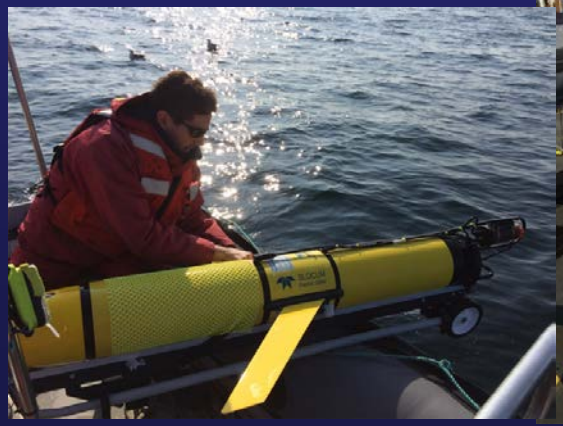
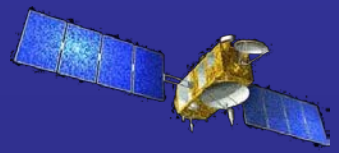
May 13, 2016 – NAVO glider recovered from NOAA Ship Gordon Gunter

August 8, 2016 – WHOI glider recovered from R/V Tioga



# Operation



Iridium satellite

↘

NAVO glider operation center

↘ *decrypted*

Transfer DMON data to WHOI

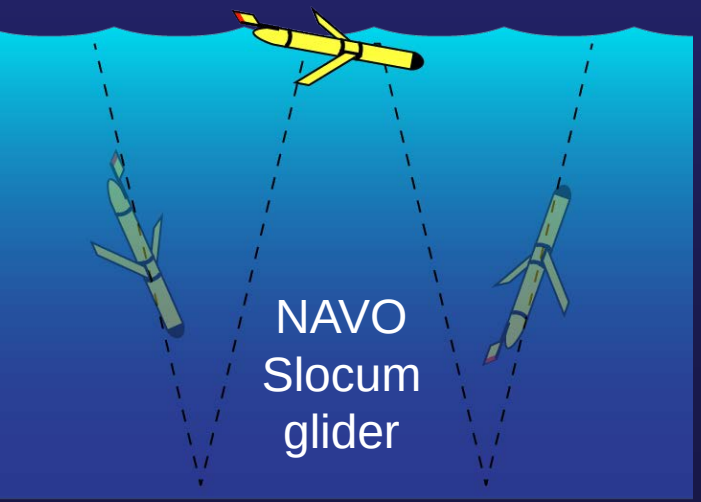
↘

dcs.whoi.edu

↓

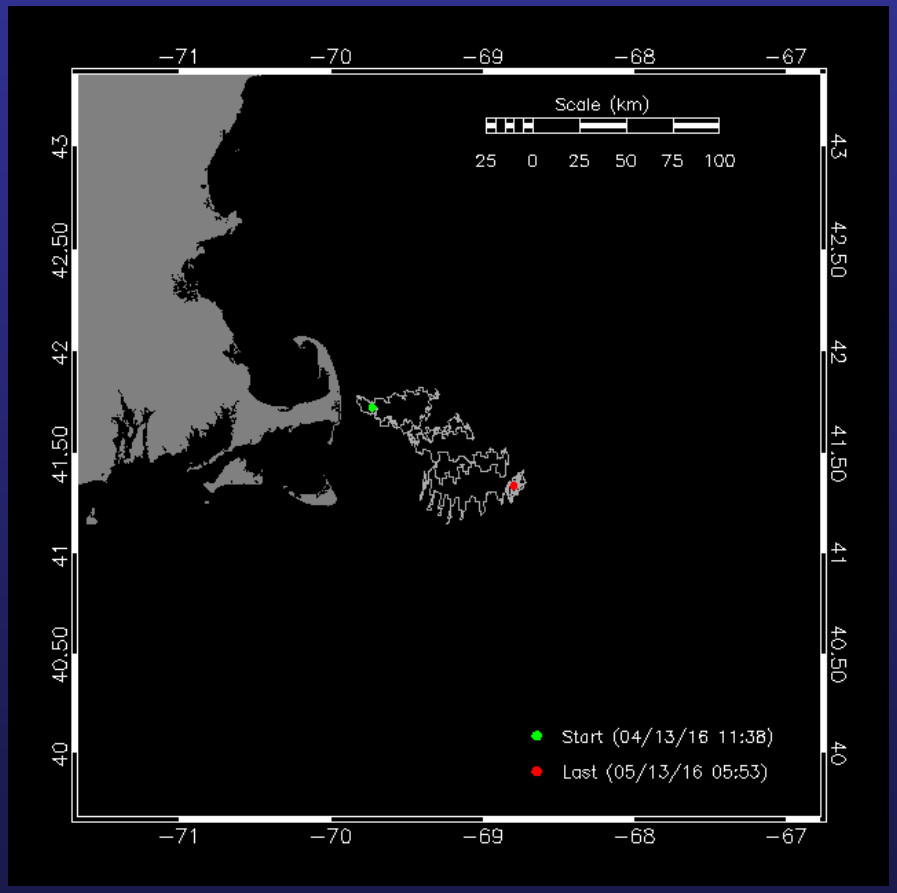
Analyst review

*encrypted DMON data*

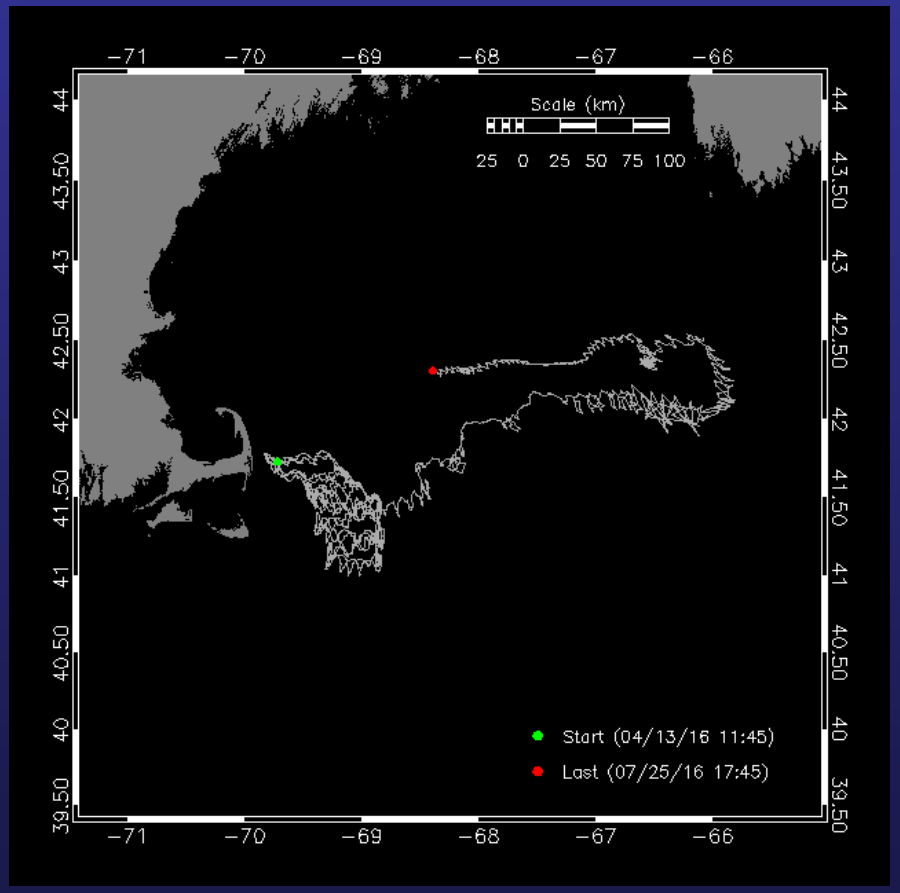


# Operation

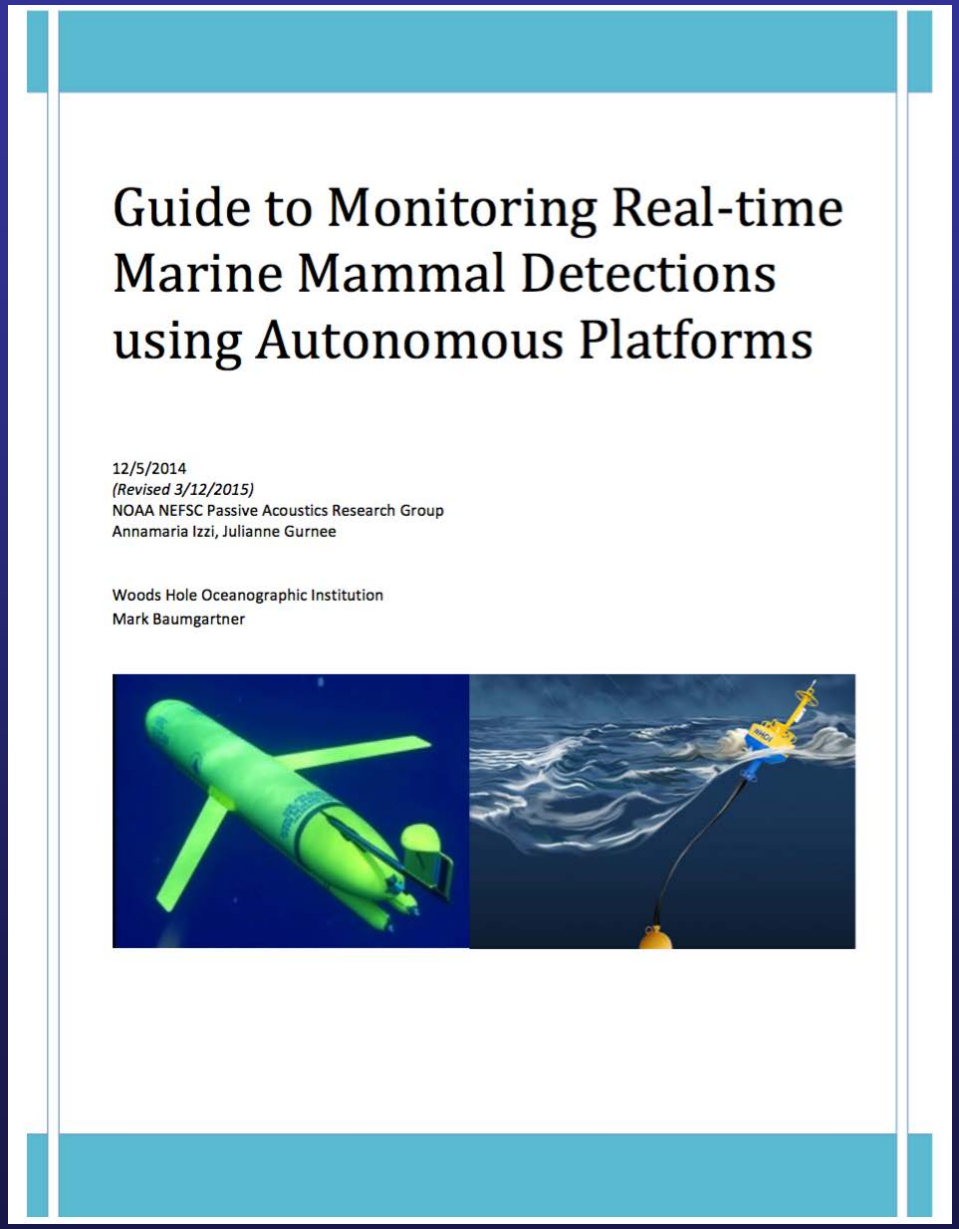
## NAVO glider




## WHOI glider



# Training and mirror analysis




Trained NAVFAC analysts to review pitch tracks and estimate species occurrence

- Cara Hotchkin
- Jackie Bort Thornton

Each analyst and Julianne Gurnee (NOAA NEFSC) analyzed NAVO glider pitch tracks in near real time independently

Compared analyst results to determine inter-analyst variability and how transferrable analyst skills are

# Mirror analysis results

*Analyst 1*

| *Analyst 2* | Detected | Possibly detected | Not detected |
|---|---|---|---|
| Detected | a | b | c |
| Possibly detected | d | e | f |
| Not detected | g | h | i |

Agreement = (a + e + i) / (a + b + c + d + e + f + g + h + i) × 100

Disagreement = (c + g) / (a + b + c + d + e + f + g + h + i) × 100

# Mirror analysis results

| Species | Agreement with expert | | Disagreement with expert | |
|---|---|---|---|---|
| | *Cara* | *Jackie* | *Cara* | *Jackie* |
| Right | 99.2 | 99.4 | 0.0 | 0.0 |
| Humpback | 82.6 | 84.0 | 3.8 | 5.9 |
| Sei | 97.6 | 97.6 | 1.4 | 0.4 |
| Fin | 97.9 | 97.9 | 0.4 | 0.6 |

*Analyst 1*

| *Analyst 2* | Detected | Possibly detected | Not detected |
|---|---|---|---|
| Detected | a | b | c |
| Possibly detected | d | e | f |
| Not detected | g | h | i |

Agreement = (a + e + i) / (a + b + c + d + e + f + g + h + i) × 100

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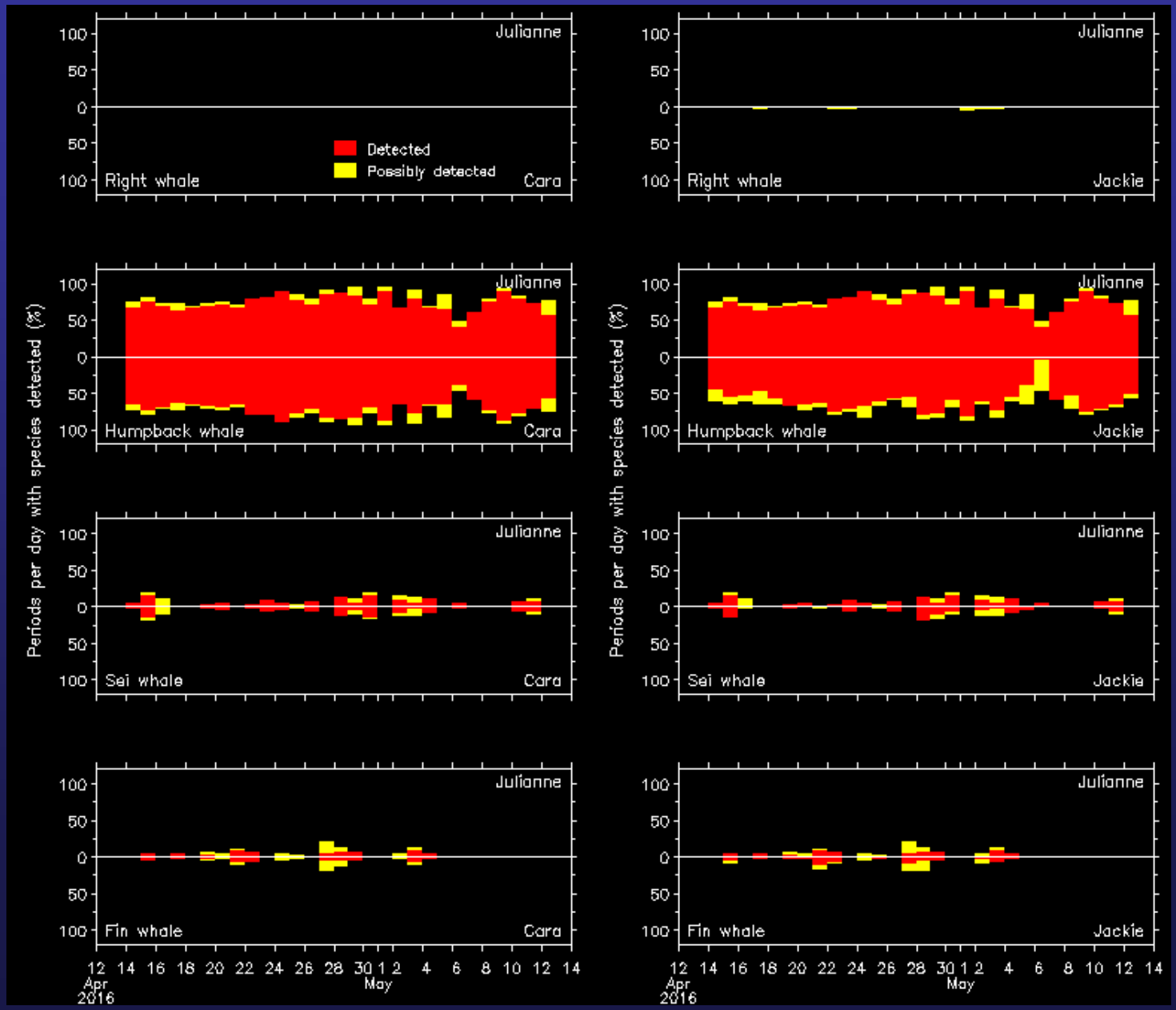
# Mirror analysis results




Right

Humpback

Sei

Fin

- Detected
- Possibly detected
- Not detected

# Summary

- DMON detection data encrypted
- NAVO glider outfitted with external DMON
- Successful 1-month pilot mission
- Trained NAVFAC personnel to analyze near real-time data
- Excellent agreement among analysts
- Indicates training can standardize analysis such that different analysts produce the same occurrence estimates

# Demonstration event June 2017


- WHOI Slocum glider equipped with DMON
- 1 week mission in northern Gulf of Mexico
- Playback low-frequency sweeps to DMON
- Demonstrate near real-time detection capability for a variety of Navy stakeholders

# To be done

1. Encryption of audio data

2. Seamless automatic data transfer from NAVO GOC to WHOI for posting/analysis at dcs.whoi.edu

3. Navy policy modifications to allow NAVFAC to schedule glider missions

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Envisioning an LMR-sponsored technology transfer project to support these tasks…

# Acknowledgements


NAVO collaborators:

- Brian Mensi
- Scott Bruner
- Danielle Bryant
- Carl Szczechowski
- GOC glider pilots

NAVFAC/NOAA collaborators:

- Cara Hotchkin (NAVFAC Atlantic)
- Sofie Van Parijs (NOAA NEFSC)
- Peter Corkeron (NOAA NEFSC)
- Jackie Bort Thornton (NAVFAC Atlantic)
- Julianne Gurnee (NOAA NEFSC)

Funders: