Tracking porpoise underwater movements in Tidal Rapids

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The Problem

- Very little knowledge on the importance of tidal habitats for harbour porpoises.
- Need to asses collision risk with turbines. Underwater movement and dive depth.

Possible Solutions

Visual

- Relatively cheap equipment costs.
- Impossible to tell what animals are doing underwater
- Difficult detection in high sea states

Tags

- Quality of data is excellent
- Difficult/impossible to catch animals.
- Time spent in tidal area per animal minimal.

PAM

- Can detect all animals within a certain range
- Some methods well developed
- Practical methods for tidal areas not developed.
- Porpoise acoustics, HF and highly directional

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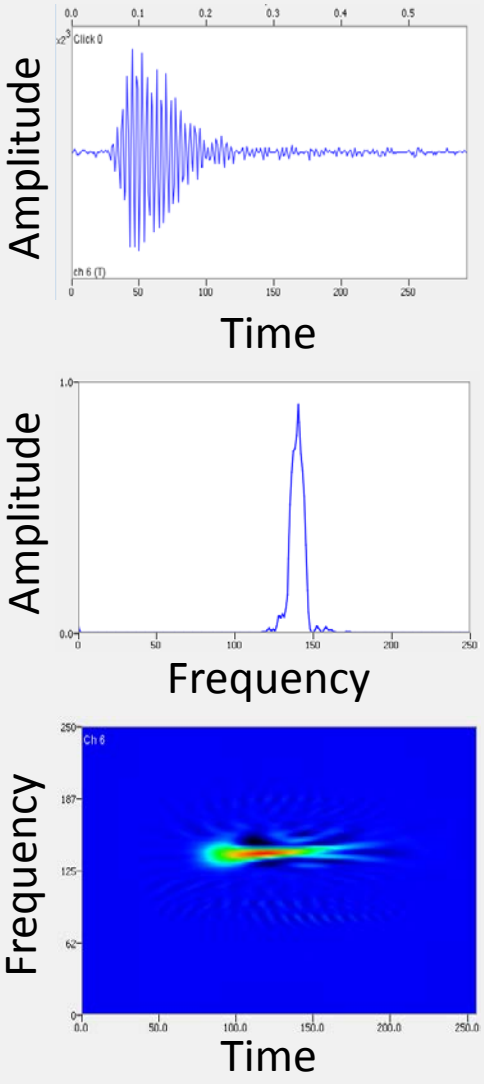
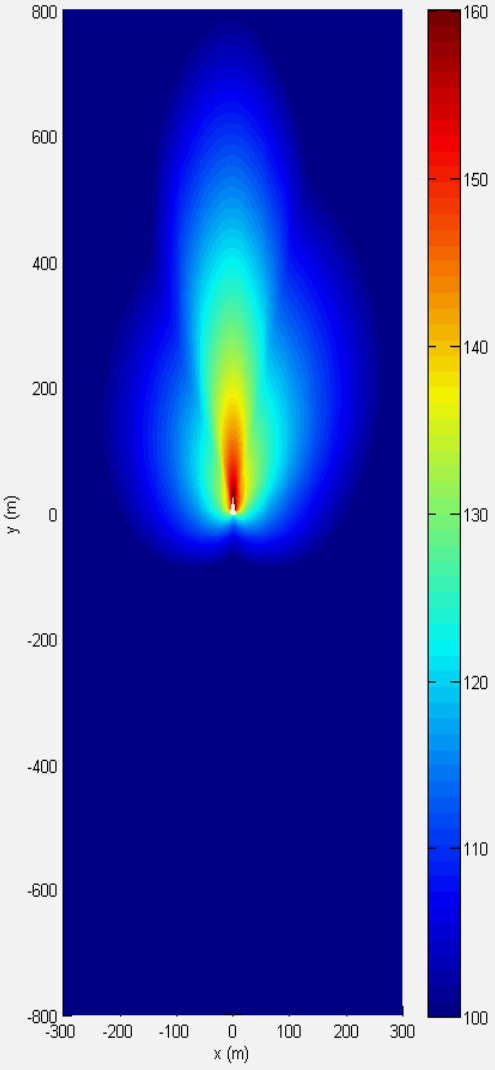
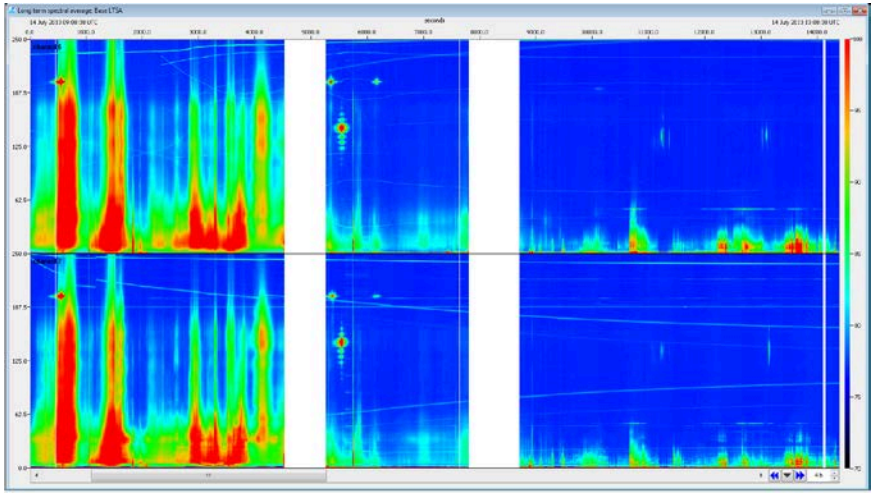
The Harbour Porpoise

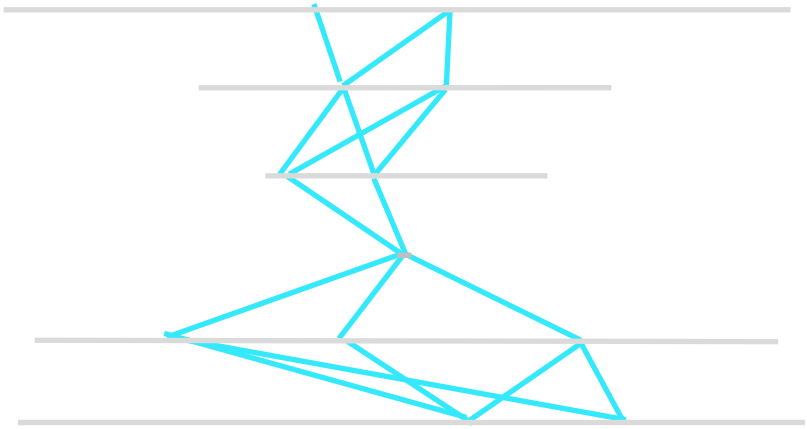




PAM in Tidal Areas

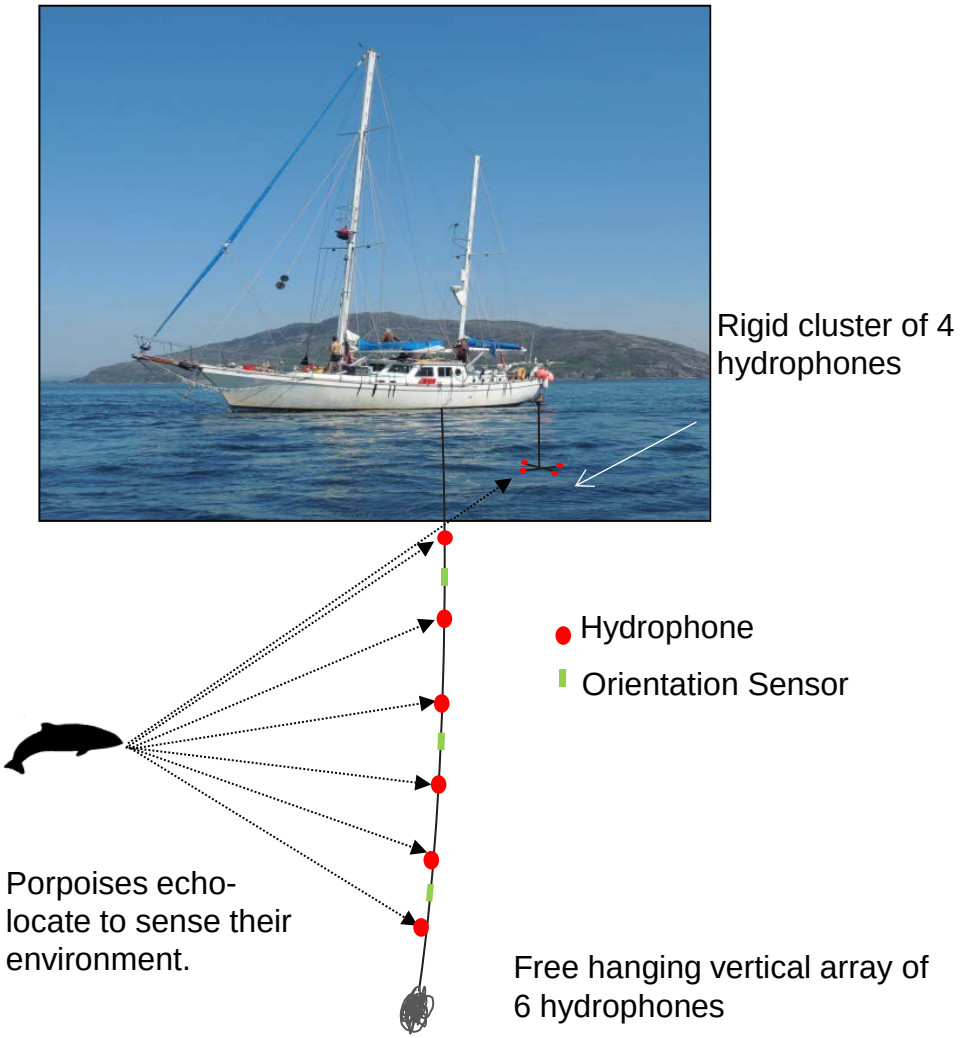
- Noise
- Narrow echo location beam and widely spaced hydrophones.
- Multiple animals present/echoes.
- If array on boat must be quickly recoverable.
- Technology for HF recordings.



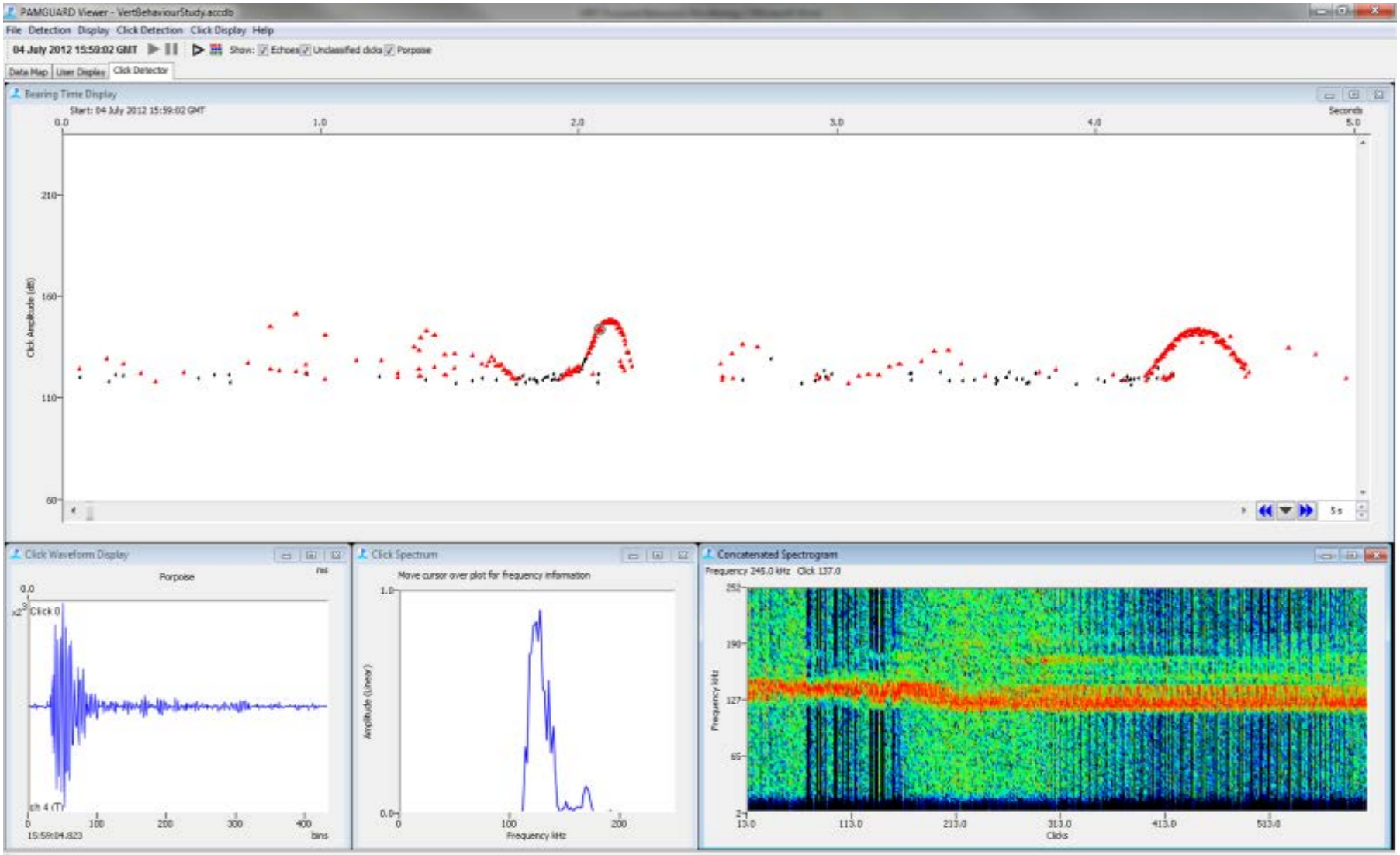


Hydrophone Array

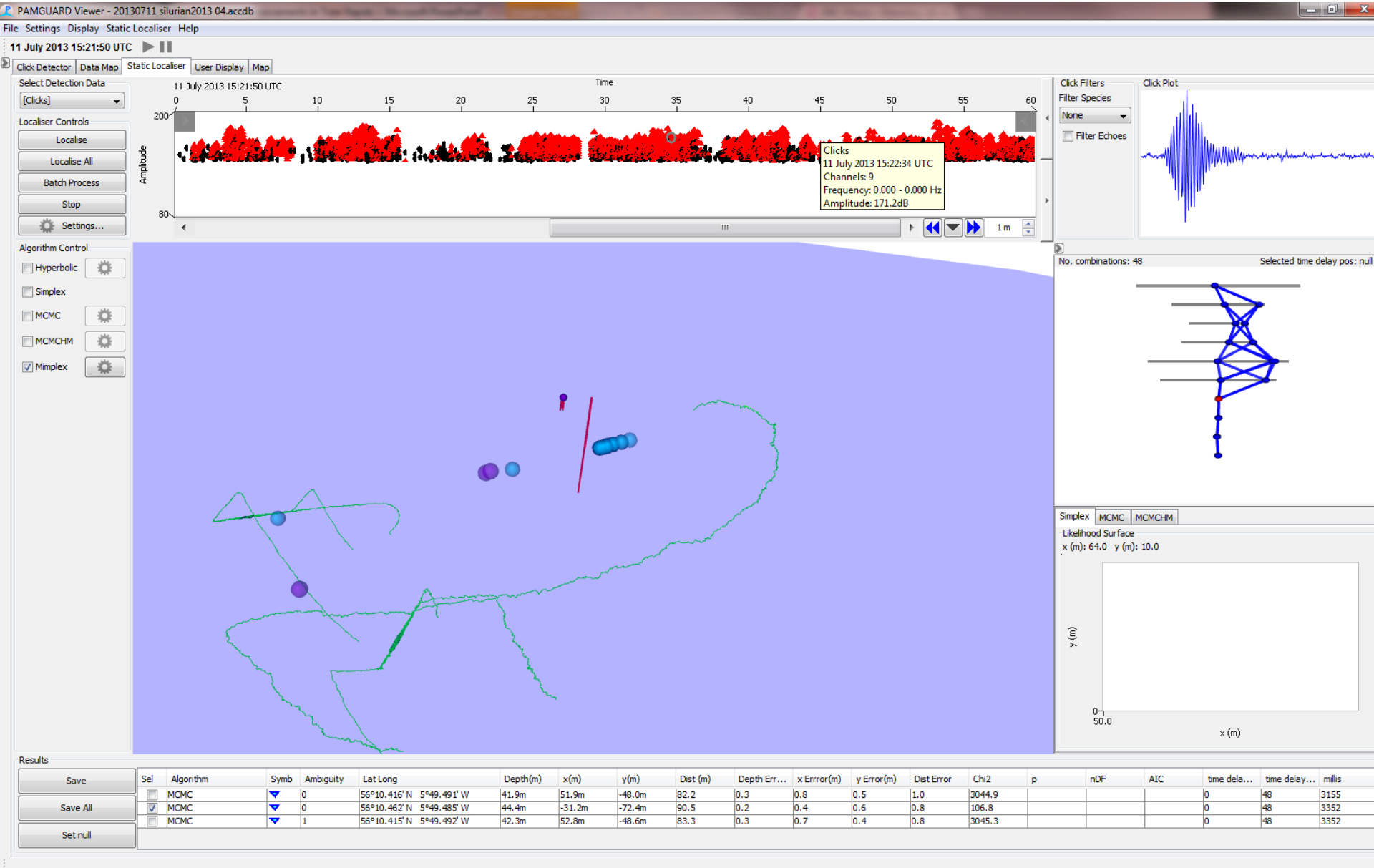
- Drifting hydrophone array reduces flow noise.
- Array is quickly recoverable via winch.
- Open Tags model hydrophone positions.
- Quiet platform and long vertical baseline.
- NI tech for recordings.



PAMGUARD

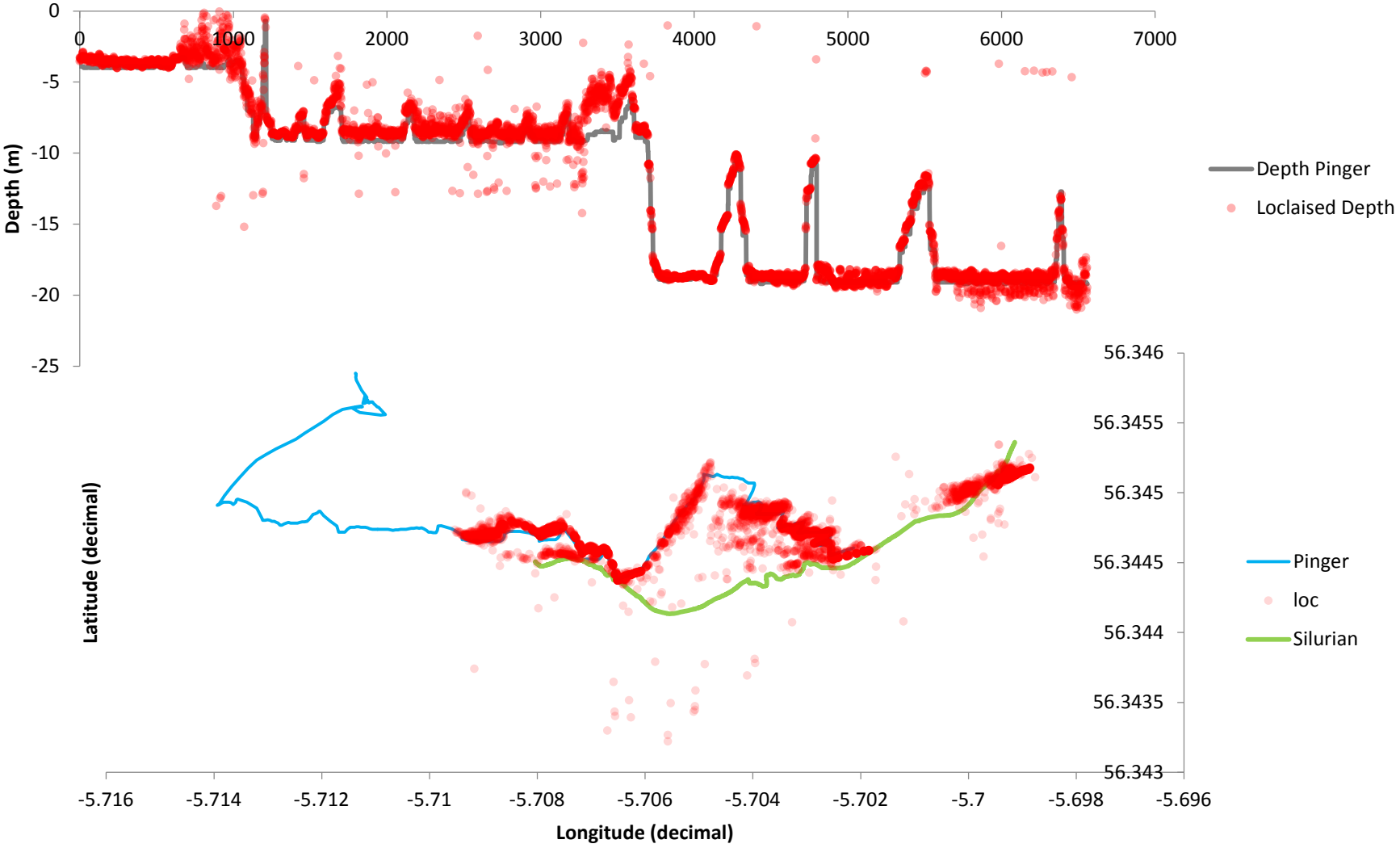

PAMGUARD Viewer - VertBehaviourStudy.accdb
File Detection Display Click Detection Click Display Help
04 July 2012 15:59:02 GMT
Show: Echoes Unclassified clicks Porpoise
Data Map User Display Click Detector
Bearing Time Display
Start: 04 July 2012 15:59:02 GMT
Seconds
Click Amplitude (dB)
Click Waveform Display
Porpoise
Click 0
ch 4 (T)
15:59:04.823
bins
Click Spectrum
Move cursor over plot for frequency information
Amplitude (Linear)
Frequency kHz
Concatenated Spectrogram
Frequency 245.0 kHz Click 137.0
Frequency kHz
Clicks

MET Localiser

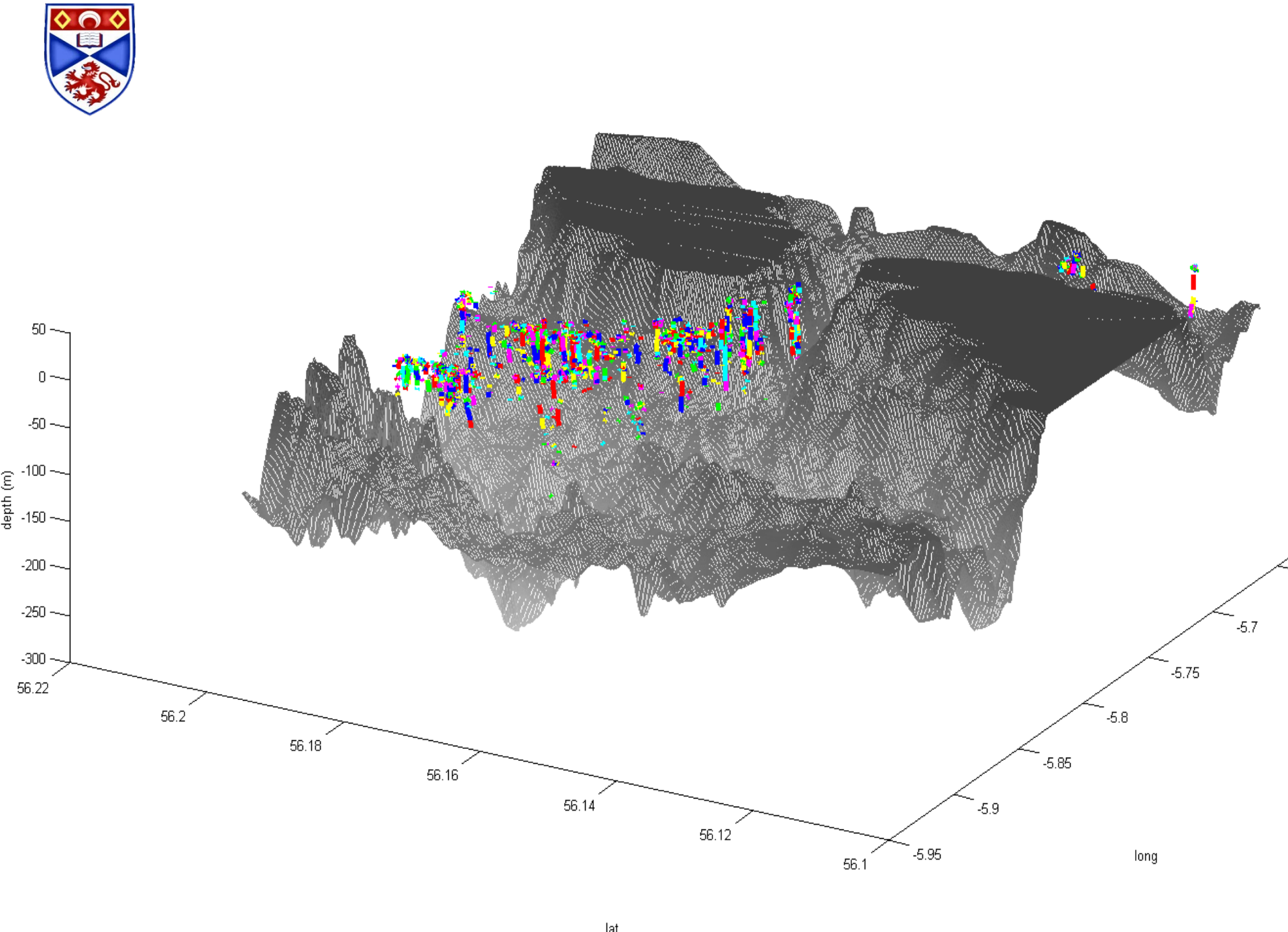


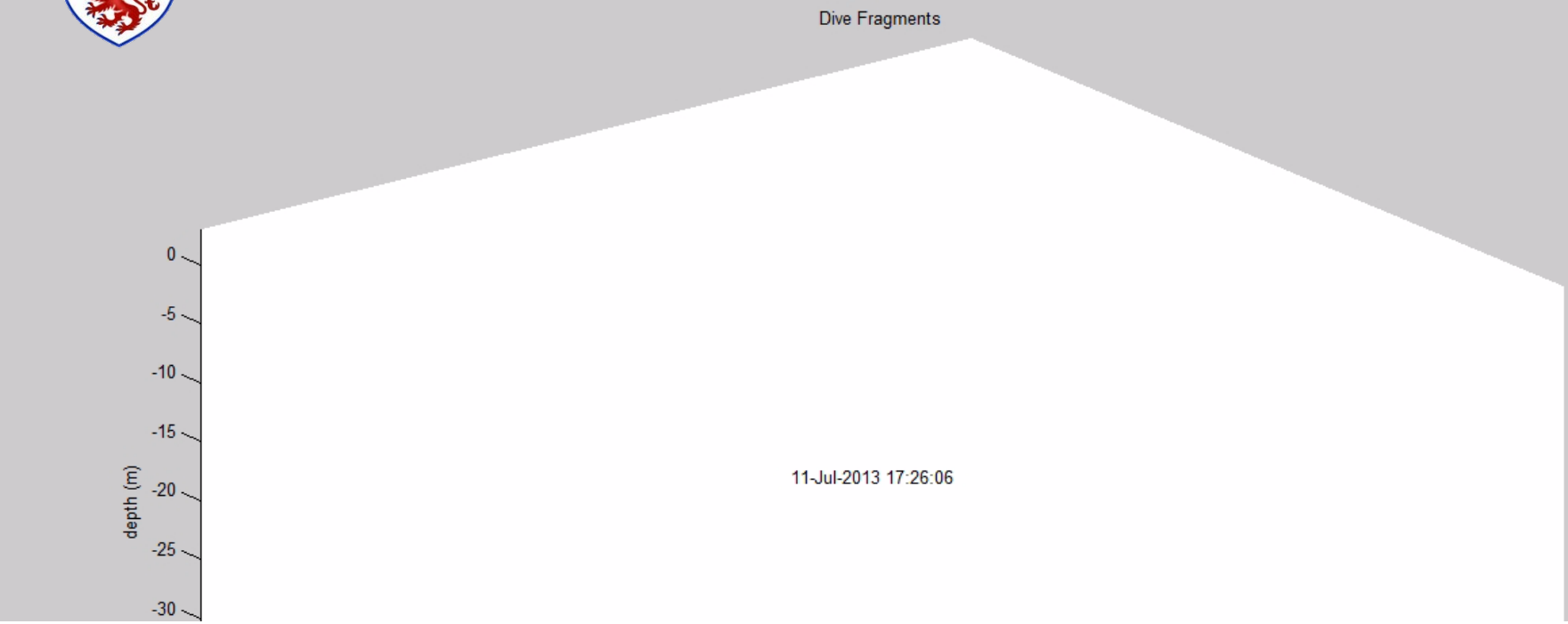
Accuracy

- Calibration trials

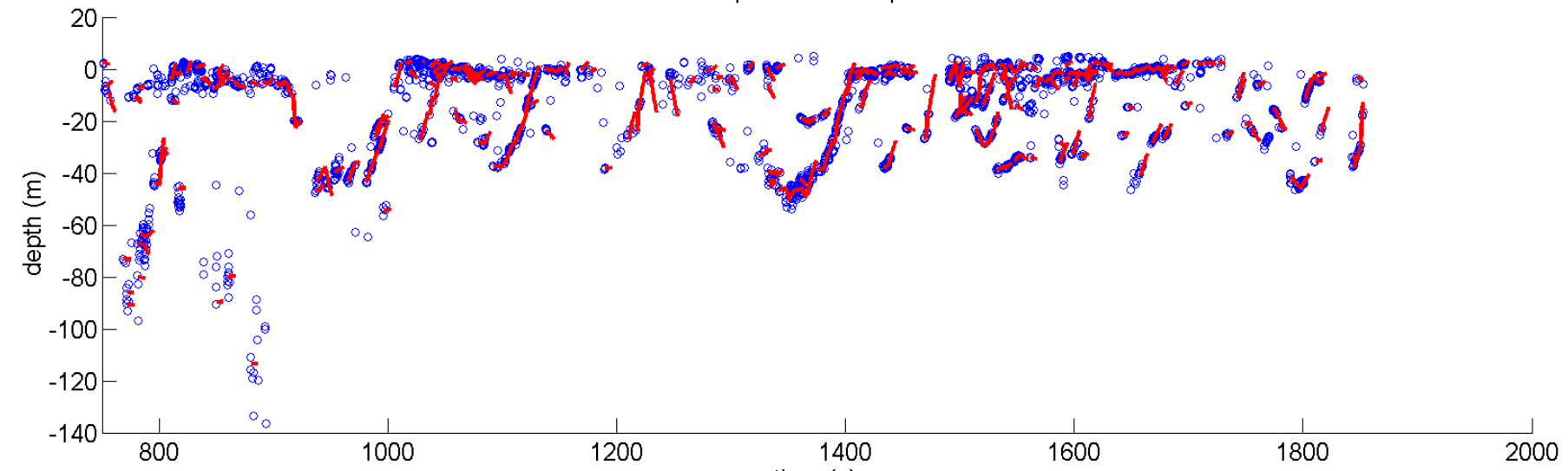


Corryvreckan Survey 2013


depth (m)
50
0
-50
-100
-150
-200
-250
-300
56.22
56.2
56.18
56.16
56.14
56.12
56.1
lat
-5.95
-5.9
-5.85
-5.8
-5.75
-5.7
long

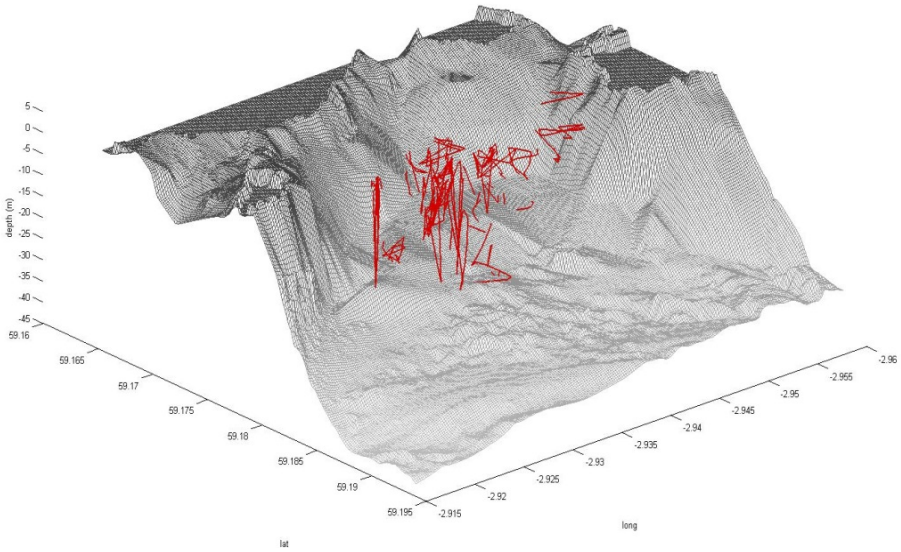


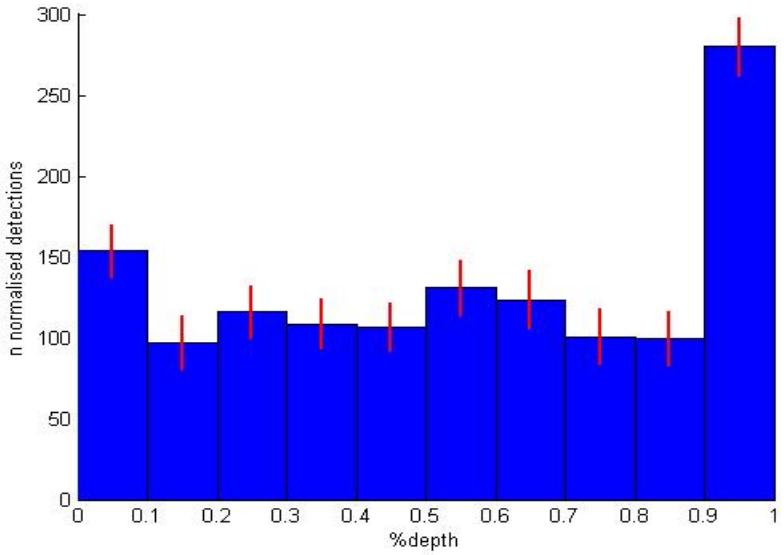
Porpoise Dive Depths

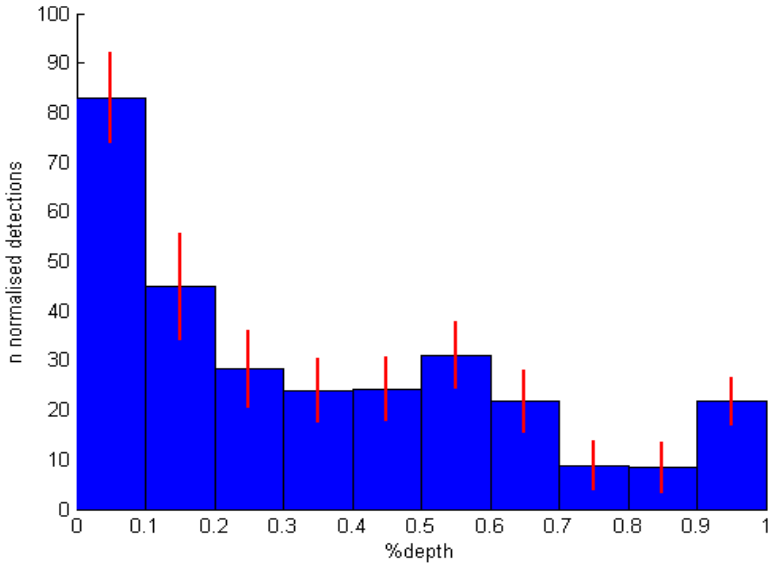


Predicting Collision Risk

- Depth distribution is a start when assessing collision risk
- Different patterns in different places. Early days but we are building up a picture.
- 3D tracking means that we can begin to look at ‘flux’ of animals; movement of animals through an area.

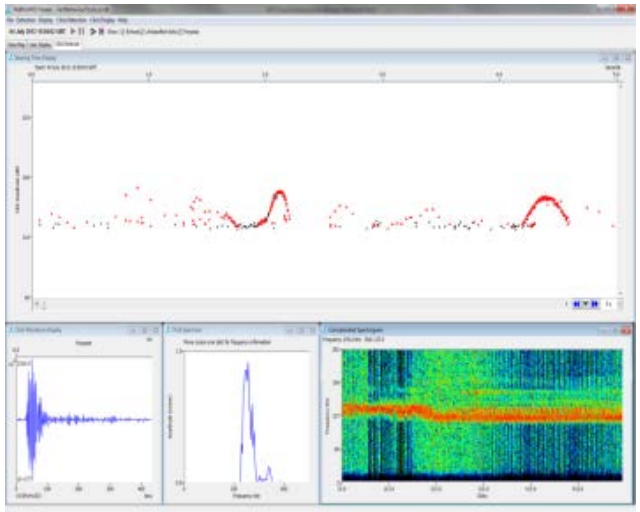


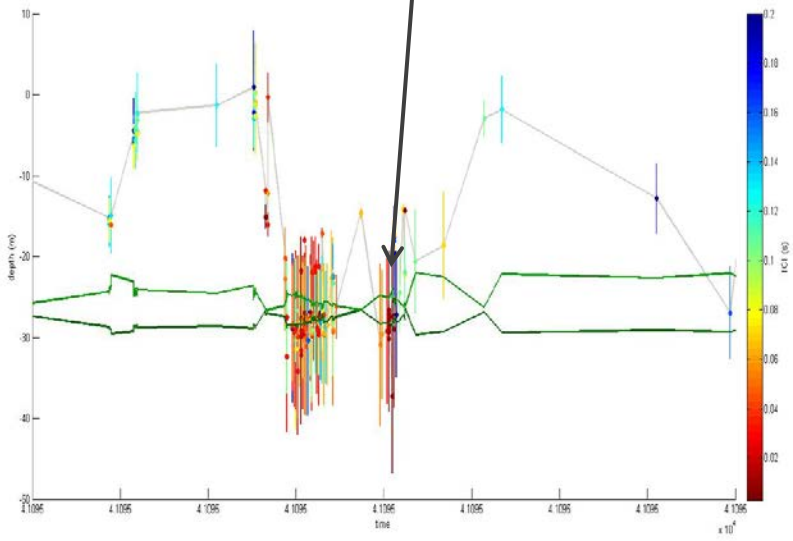




Behaviour in Tidal Habitats

- Can cross reference behaviour with positions.
- Current work includes cross reference dive tracks with inter click interval.
- Possible to build up a 3D beam profile to look at echolocation behaviour ?





Moving to an Autonomous System

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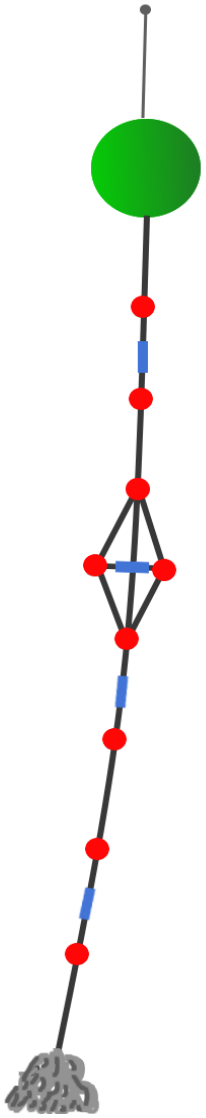
NERC KE



- Cheaper to build, cheaper to deploy.
- Should be deployable from a rib.
- Can cope with worse conditions.
- Will record raw .wav files, GPS location and orientation data.
- Will integrate with PAMGUARD
- First testing this summer.
- **Open** Hardware* and software .

Summary

- PAM can be used to accurately track porpoise and other vocalising cetaceans underwater.
- Interesting data on behaviour in tidal habitats has been collected and system has been validated over a number of years.
- Provides some of the data required to predict collision risk.
- An open, more practical and cost effective autonomous system is being developed.

Thanks to

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Welsh Government

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