

DEEP SEA SCIENCE.

OCEAN
NETWORKS
CANADA
SCIENCE

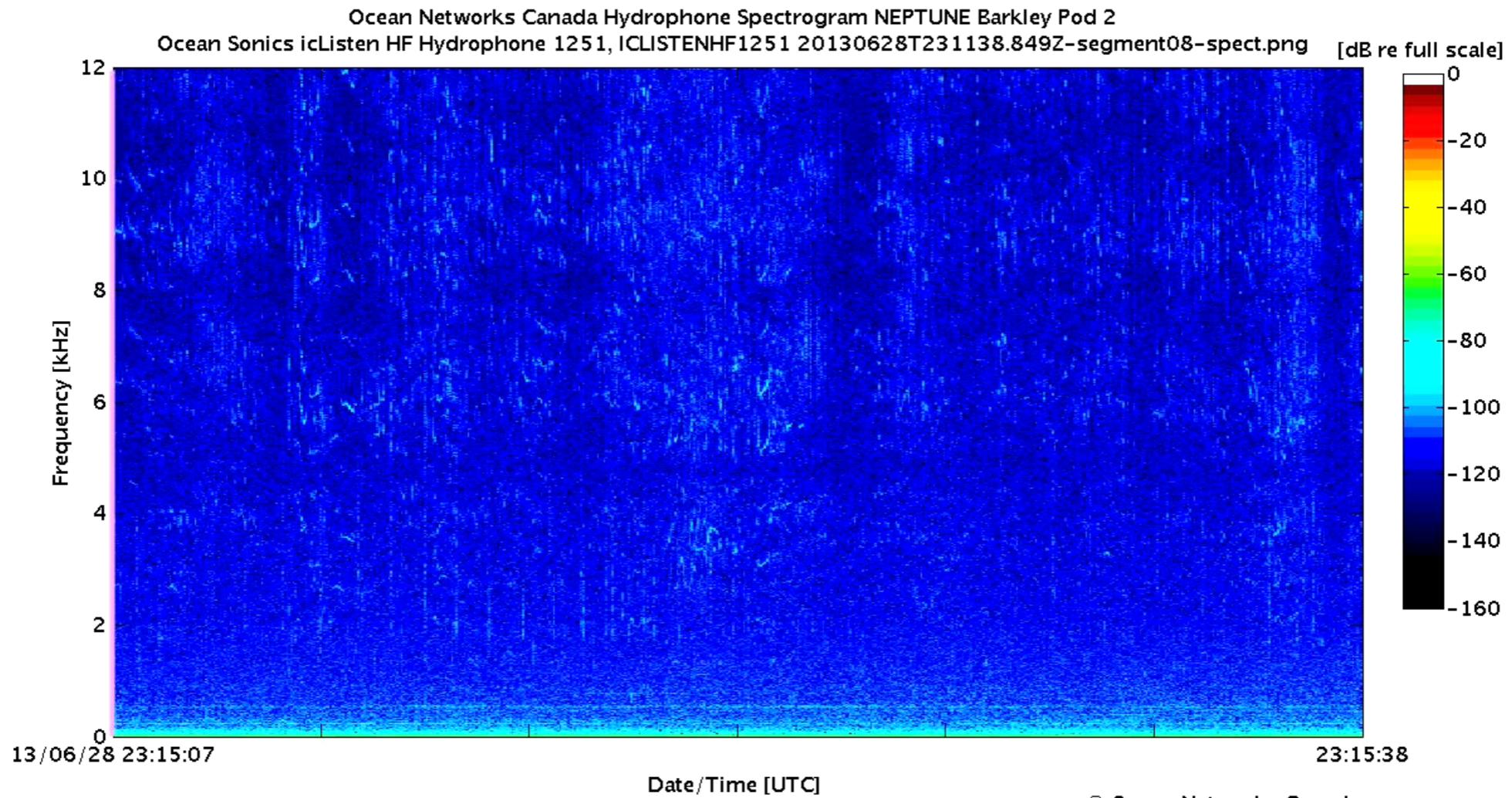
AMBIENT ACOUSTICS IN THE BARKLEY CANYON REGION

Kristen Kanes

5 Oct 2015

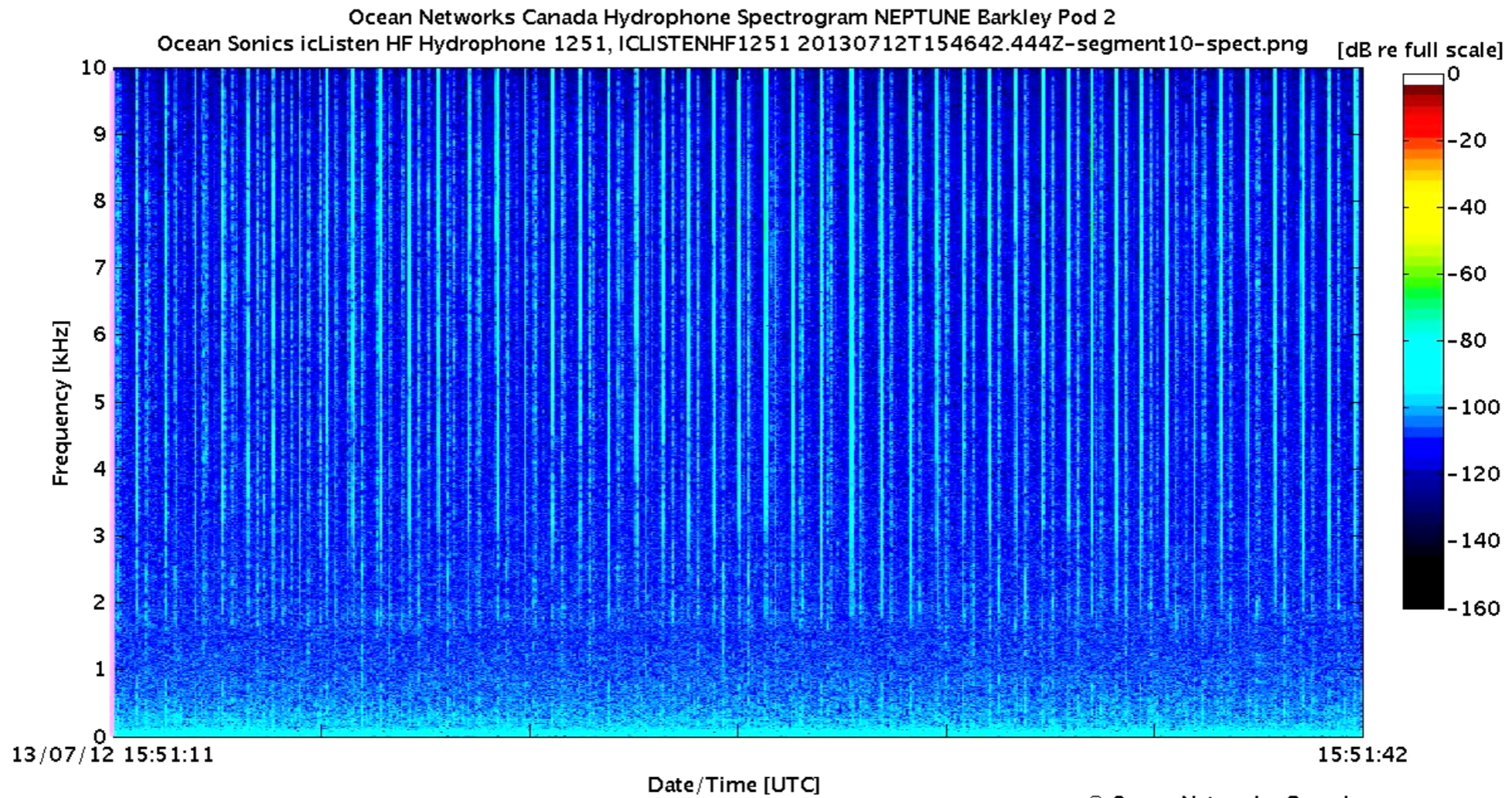
AN INITIATIVE OF  University
of Victoria

A TYPICAL DAY



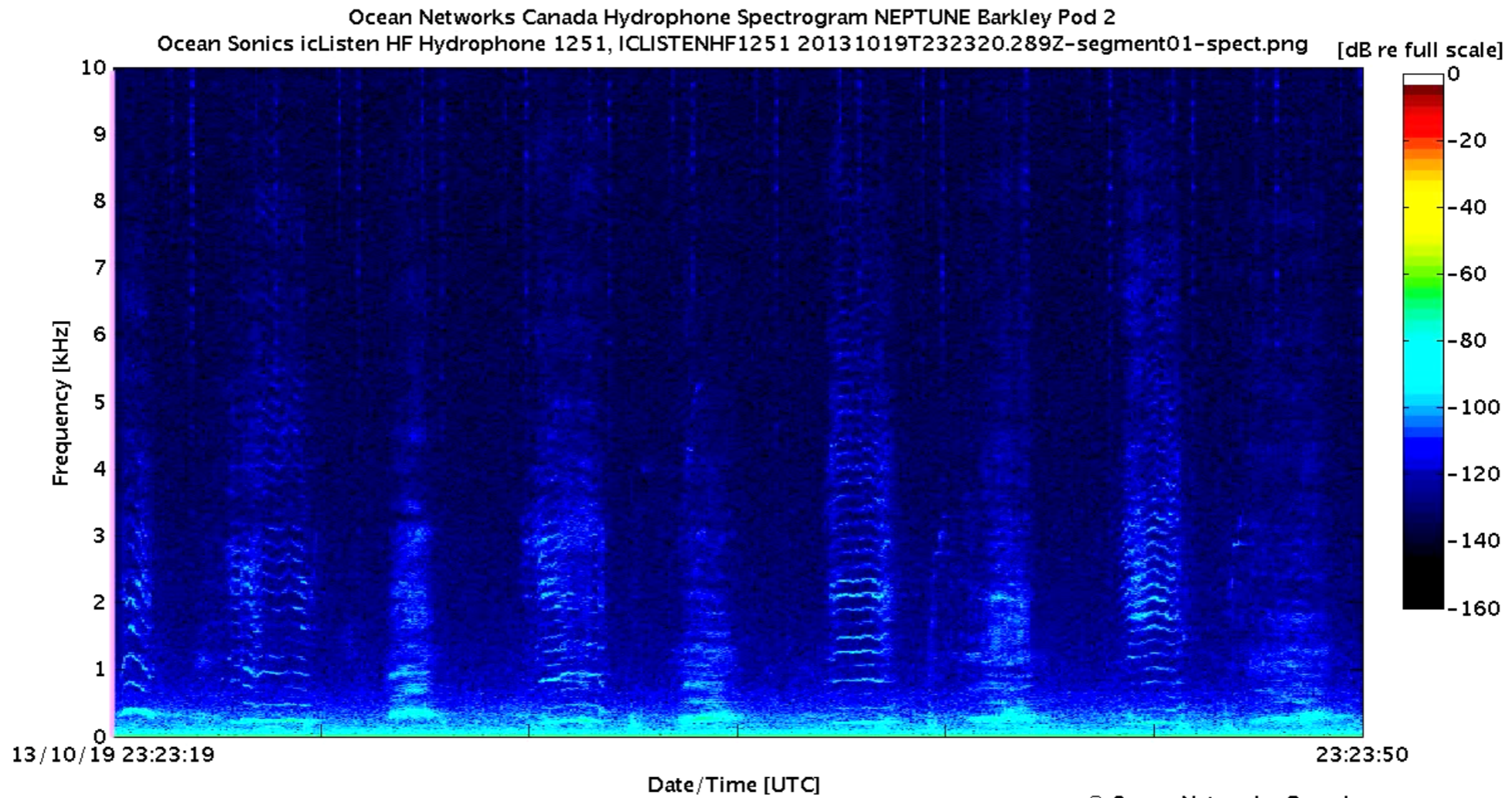
Colour values indicate Intensity in decibels, with reference to the full scale of the wav file.
Higher values on the colour scale represent louder sounds.

A TYPICAL DAY



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A TYPICAL DAY

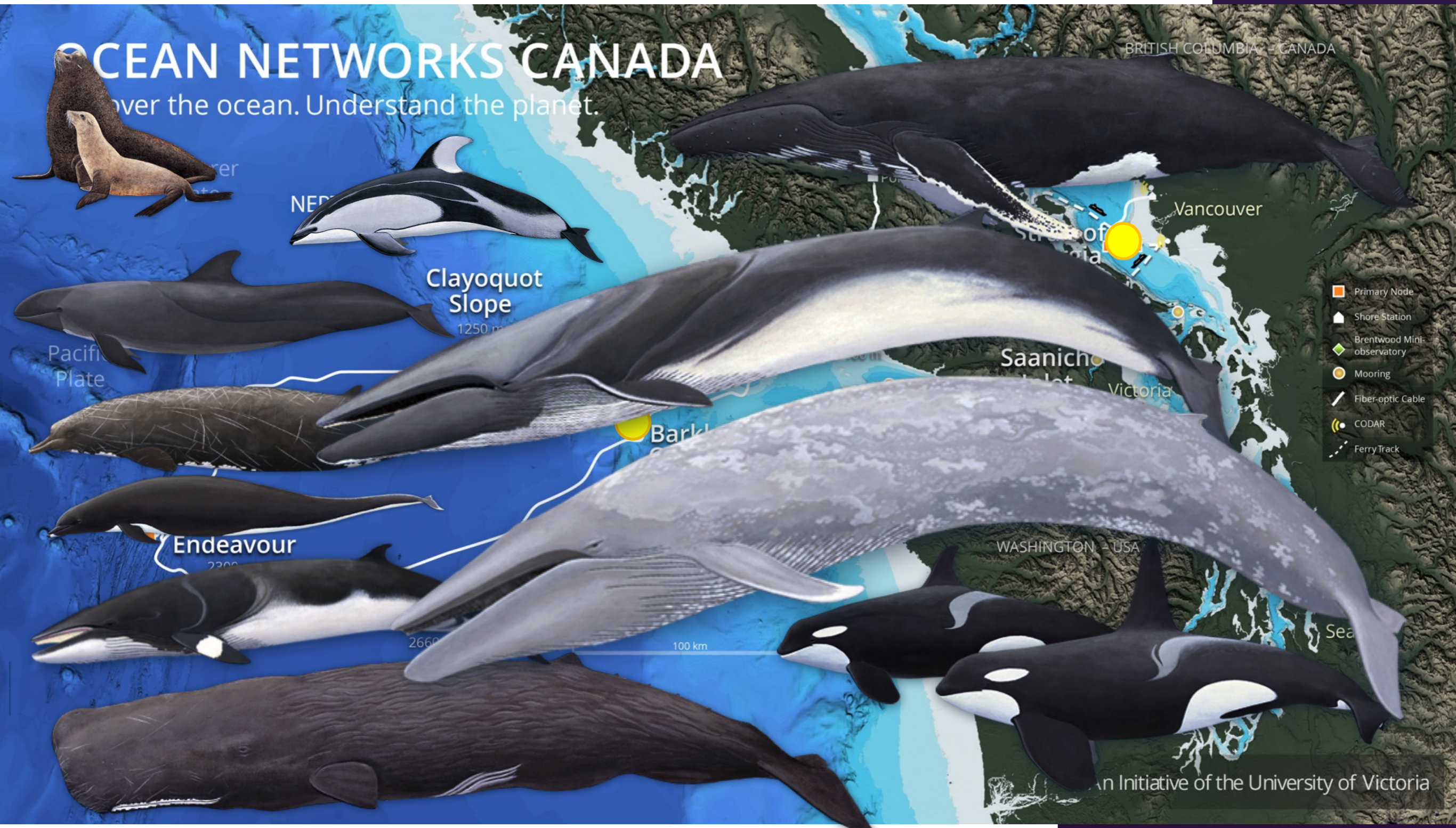


Colour values indicate Intensity in decibels, with reference to the full scale of the wav file.
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SOUND AT OCEAN NETWORKS CANADA

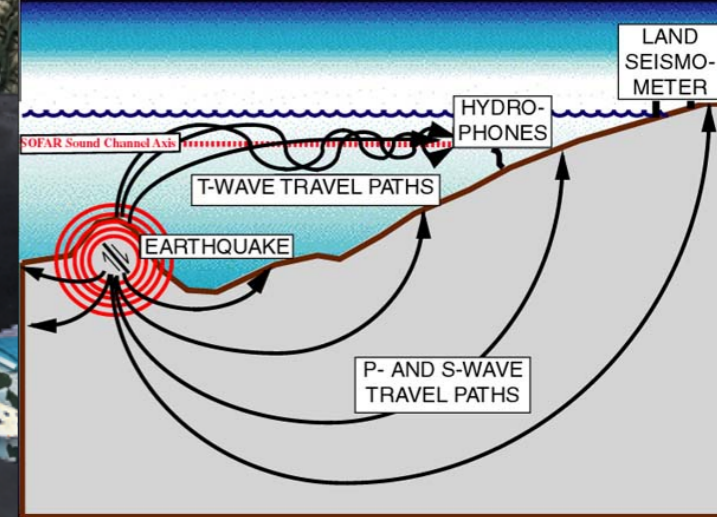
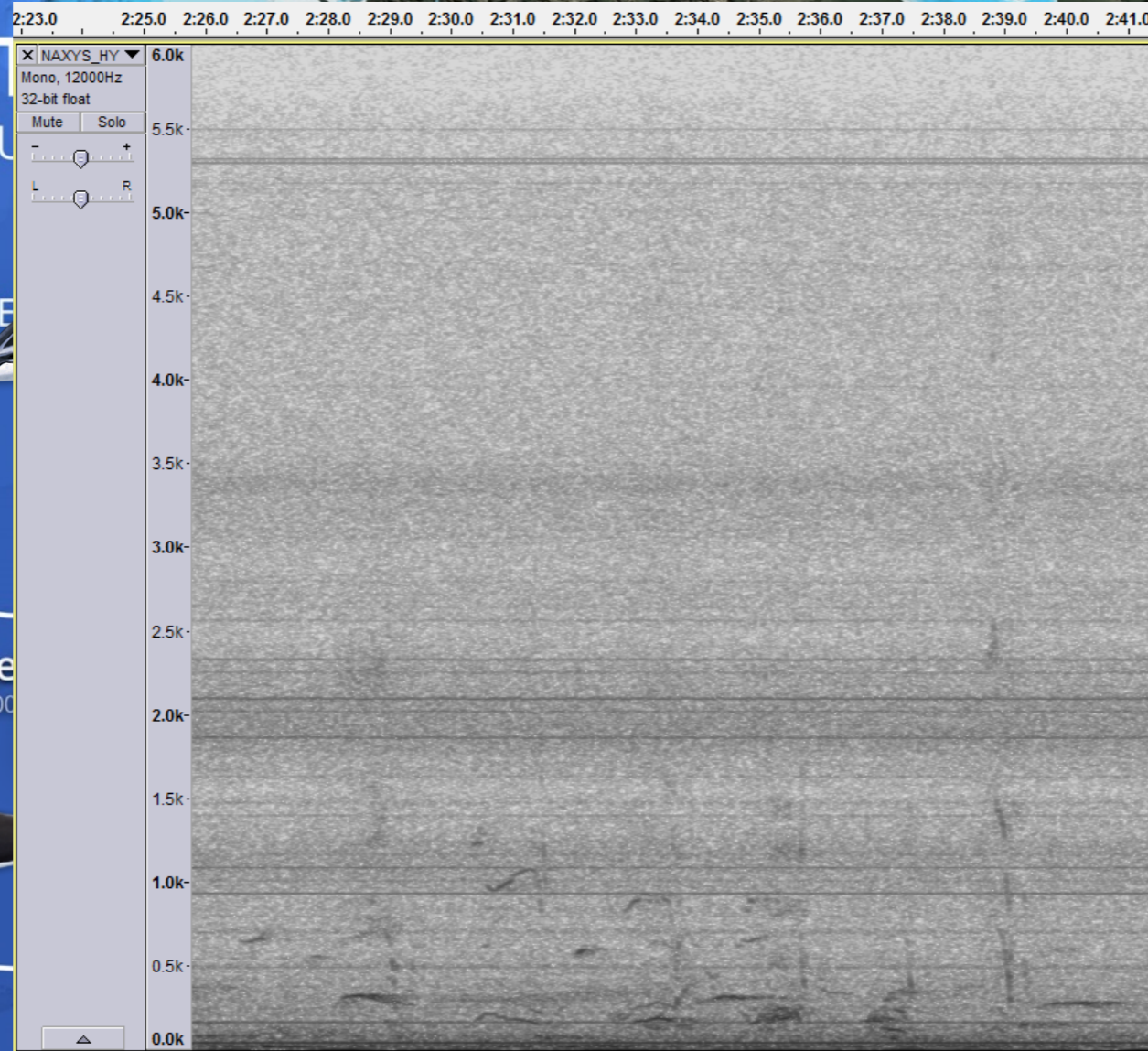
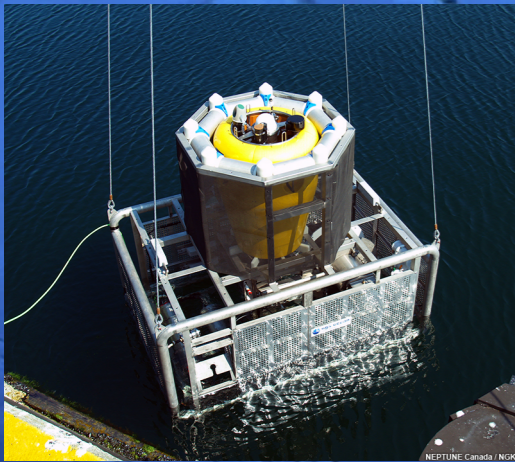
OCEAN NETWORKS CANADA

Over the ocean. Understand the planet.



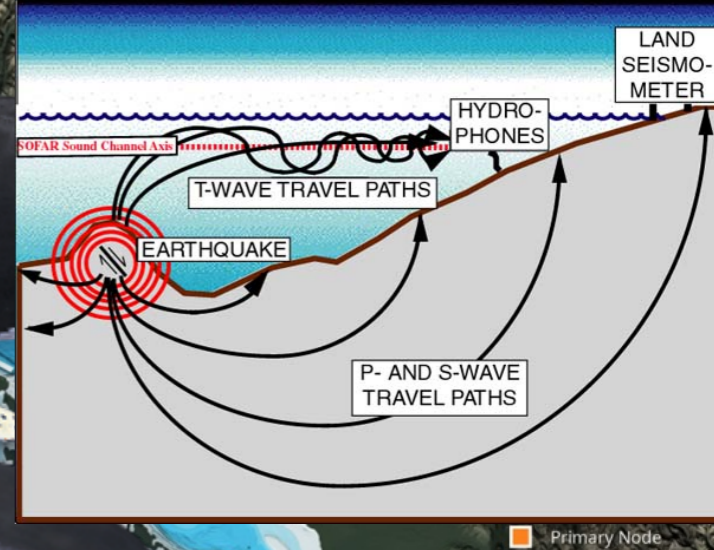
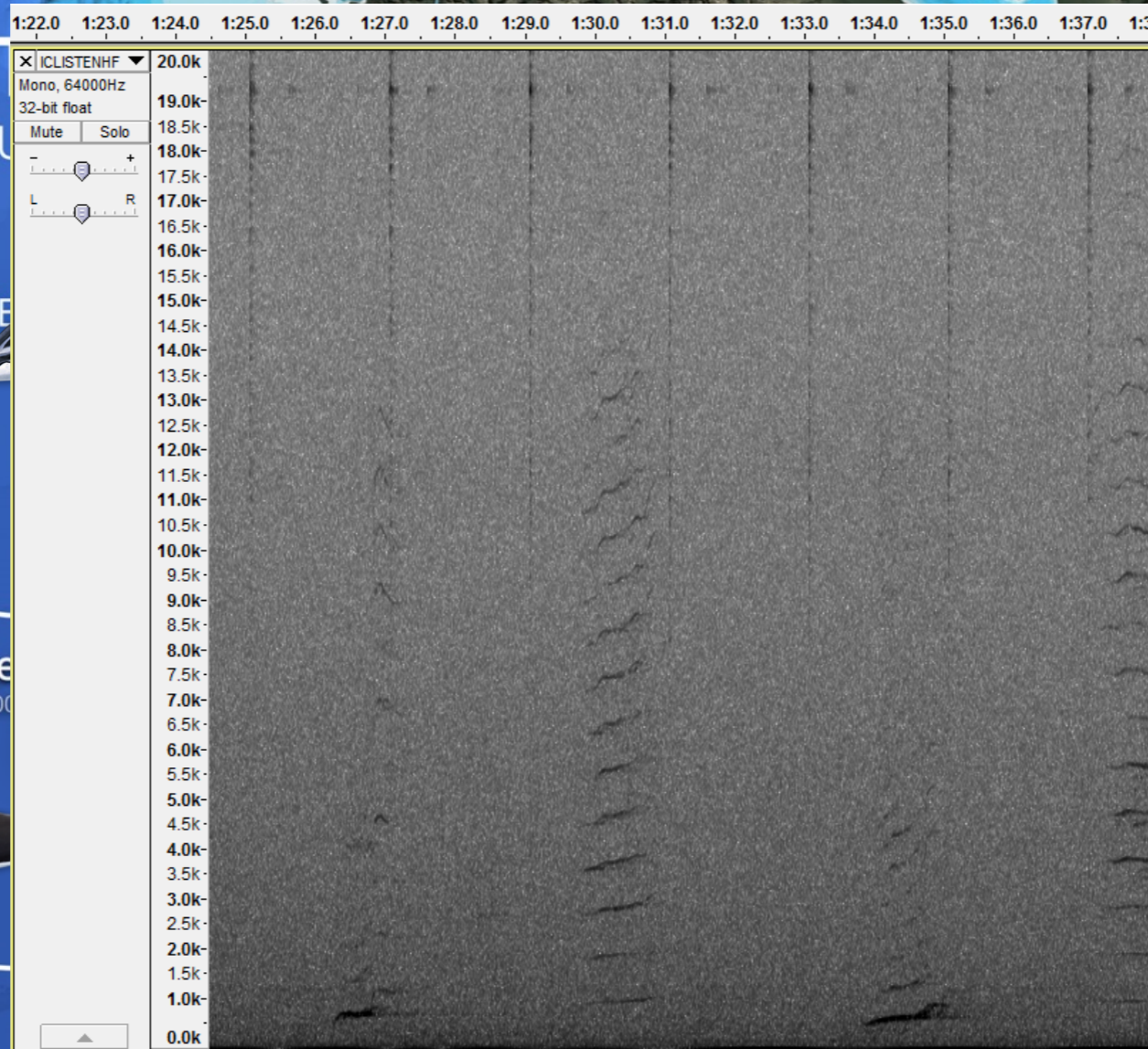
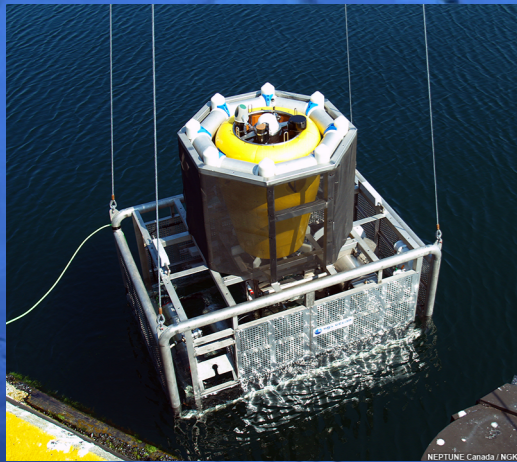
- Primary Node
- Shore Station
- Brentwood Mini-observatory
- Mooring
- Fiber-optic Cable
- CODAR
- Ferry Track

SOUND AT BARKLEY CANYON



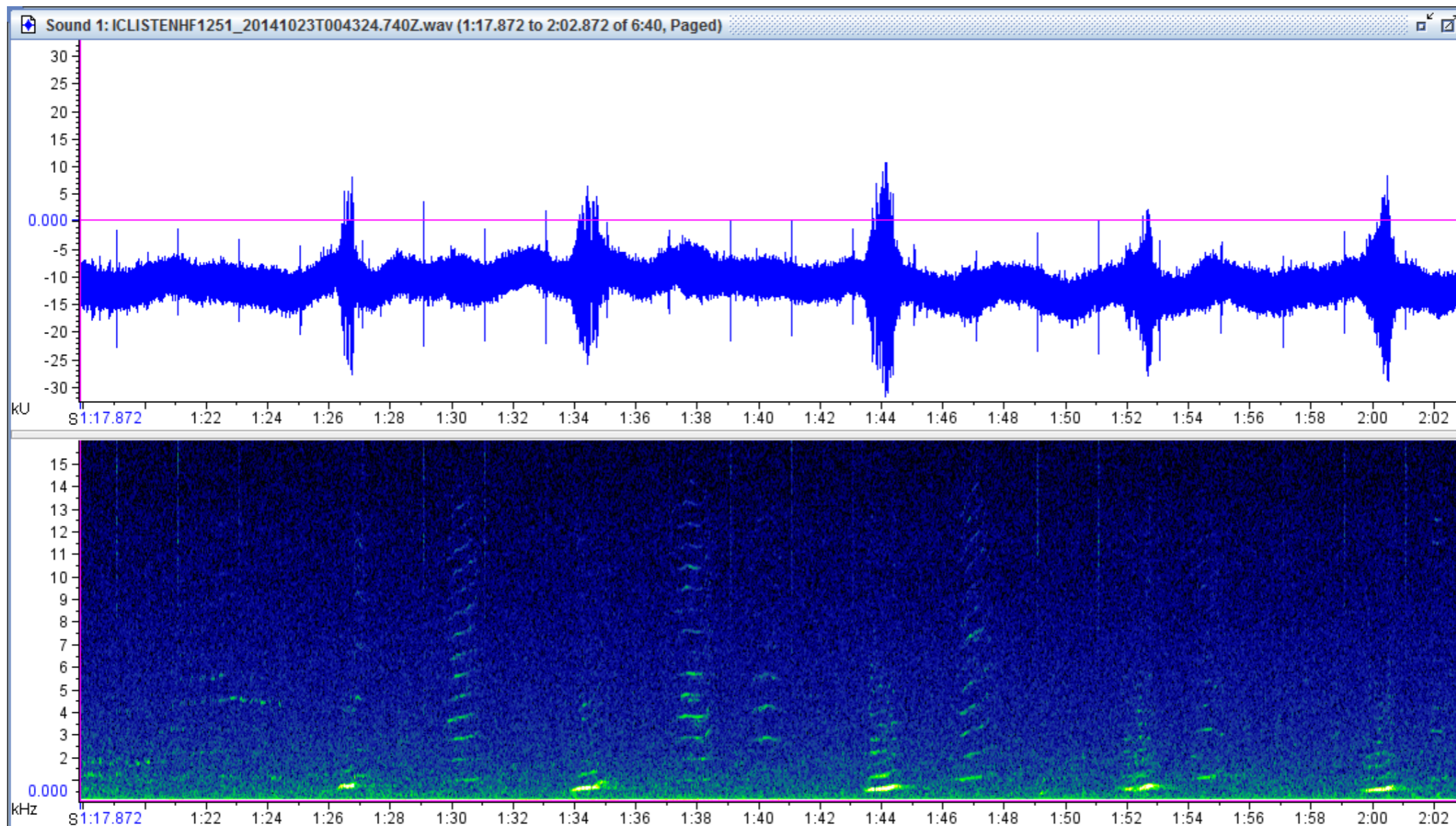
x2

SOUND AT BARKLEY CANYON



DATA MINING CHALLENGES

- Acoustic data are inherently difficult to search



DATA MINING CHALLENGES

- Acoustic data are inherently difficult to search

Ocean Networks Canada Search Hydrophone Data
Oceans 2.0

Logged in as Kristen Kanes | Profile | Help | Logout

Data Preview | Data Search | Plotting Utility | SeaTube | Digital Fishers | Cameras | More | Admin

Currently Viewing: Pacific > Northeast Pacific Ocean > Barkley Canyon > Upper Slope POD2 > Ocean Sonics icListen HF Hydrophone 1251 Date: 23-Oct-2014

Zoom - +

Ocean Sonics icListen HF Hydrophone 1251 (23157)
Barkley Canyon • 48.4264° N • 126.1744° W • 391 m
Start time: 23-Oct-2014 03:48:24.773 UTC

Intensity (dB re 1 μ Pa RMS)

Frequency (kHz)

Time (minutes on Oct 23, 2014, UTC)

Comments: Main window with 50% overlap, temporal resolution: 0.05 seconds, spectral resolution: 10 Hz, Sample frequency: 64 kHz. Frequency range shown may be reduced by calibration.

Plot generated 28-Oct-2014 18:32:39 UTC

2014-10-23 03:48:24 UTC

2014-10-23 03:53:24 UTC

Add an Annotation

Previous Day | Select Current Day | Next Day

Hydrophone Data Search

- Arctic
- Pacific
 - Northeast Pacific Ocean
 - Barkley Canyon
 - Axis POD1
 - Upper Slope
 - Upper Slope POD2
 - Ocean Sonics icListen HF Hydrophone 1251**
 - Upper Slope Vertical Profiler
 - Cascadia Basin
 - Clayoquot Slope
 - Folger Passage
 - Salish Sea

Date: 23-Oct-2014

View

Ocean Sonics icListen HF Hydrophone 1251

Location: Pacific > Northeast Pacific Ocean > Barkley Canyon > Upper Slope POD2

Deployment Dates:

- 11-May-2013 - 03-May-2014
- 07-May-2014 - 17-Sep-2015

Annotation

Resource Type: Device Data

Resource: Ocean Sonics icListen HF Hydrophone 1251

Date From (UTC): 23-Oct-2014 03:48:24

Date To (UTC): 23-Oct-2014 03:53:24

Shared

Flagged

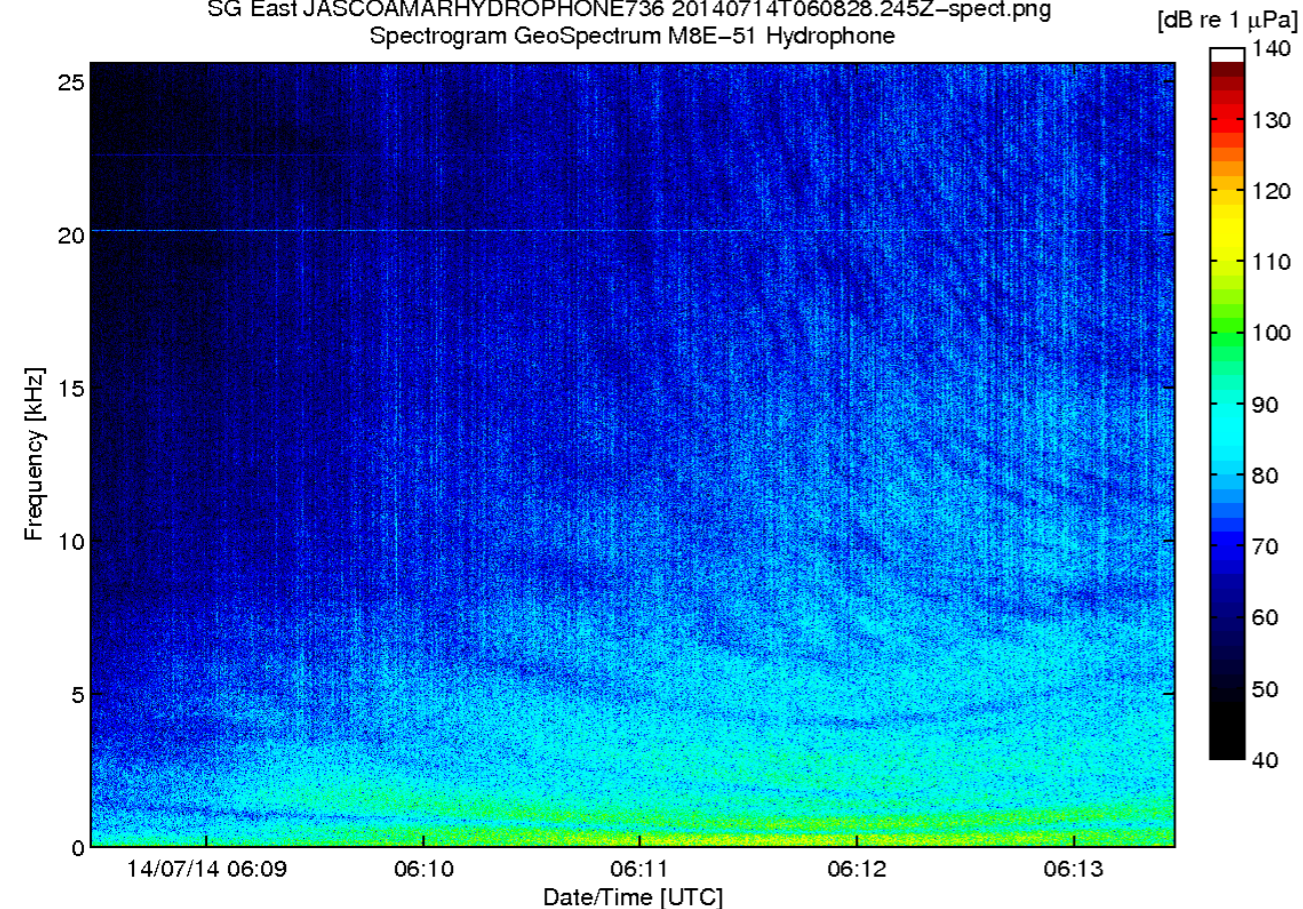
- Marine Mammals (Except Orca)
 - Orca
 - Other Marine Animals
 - Human Sounds
 - Natural Sounds
 - Other

Save Cancel

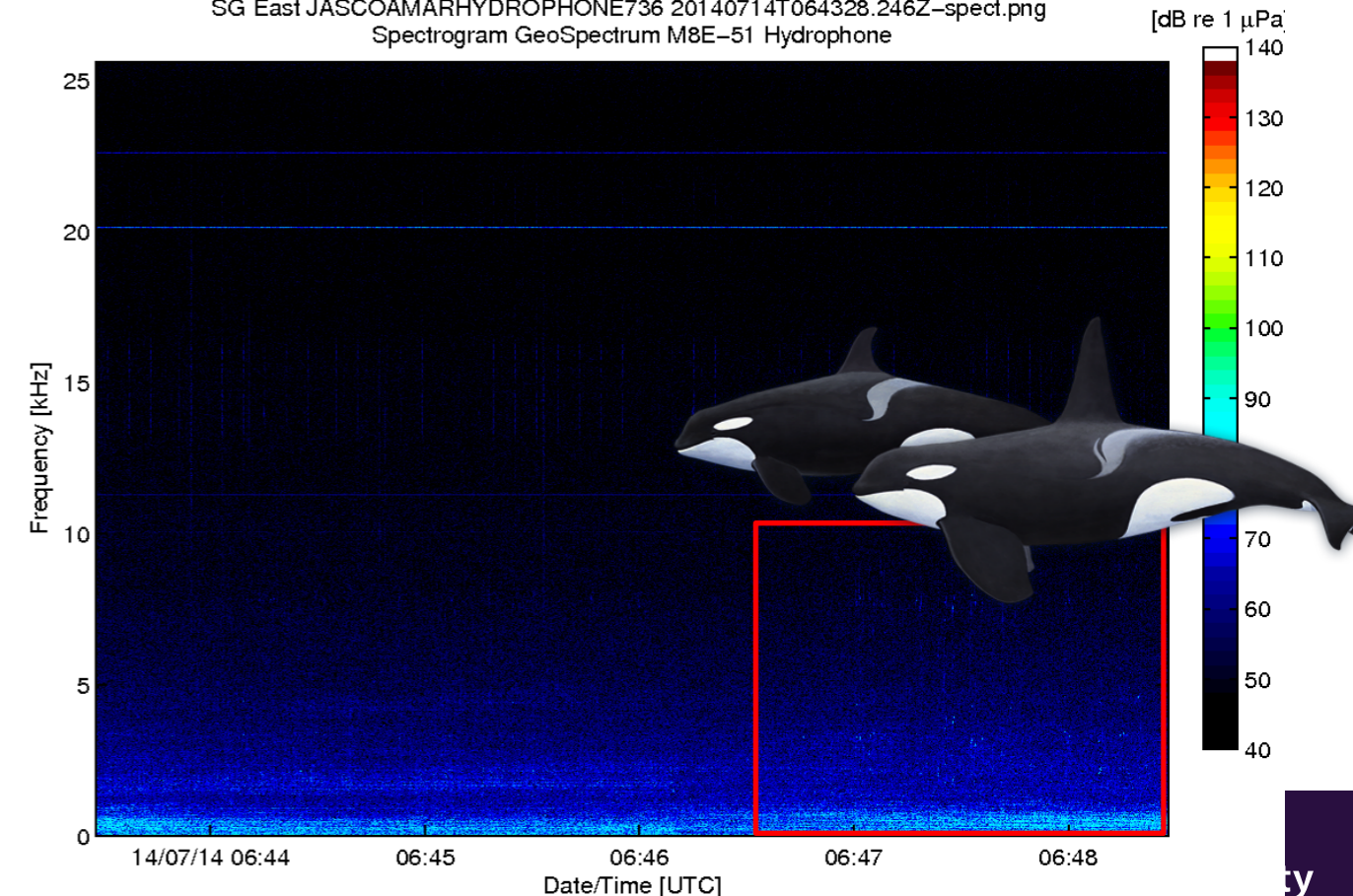
DATA MINING CHALLENGES

- Acoustic data are inherently difficult to search
- Most spectrogram settings cannot visualize all signals

SG East JASCOAMARHYDROPHONE736 20140714T060828.245Z-spect.png
Spectrogram GeoSpectrum M8E-51 Hydrophone



SG East JASCOAMARHYDROPHONE736 20140714T064328.246Z-spect.png
Spectrogram GeoSpectrum M8E-51 Hydrophone



DATA MINING CHALLENGES

- Acoustic data are inherently difficult to search
- Most spectrogram settings cannot visualize all signals
- Quantity: 17 current hydrophones collecting continuous data

DATA MINING CHALLENGES

- Acoustic data are inherently difficult to search
- Most spectrogram settings cannot visualize all signals
- Quantity: 17 current hydrophones collecting continuous data
- How can we make these data mineable for researchers?

ARE CLASSIFIERS THE SOLUTION?

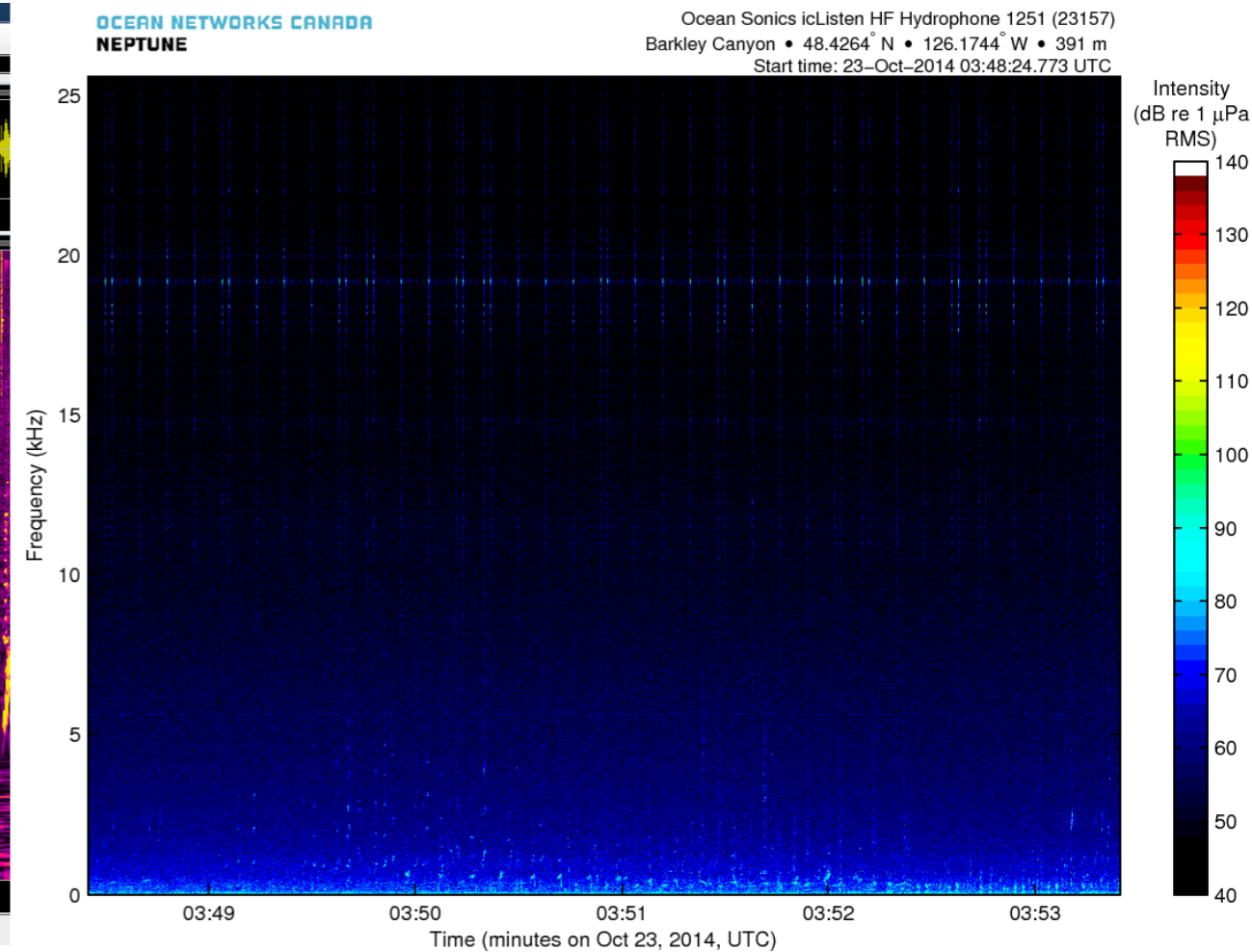
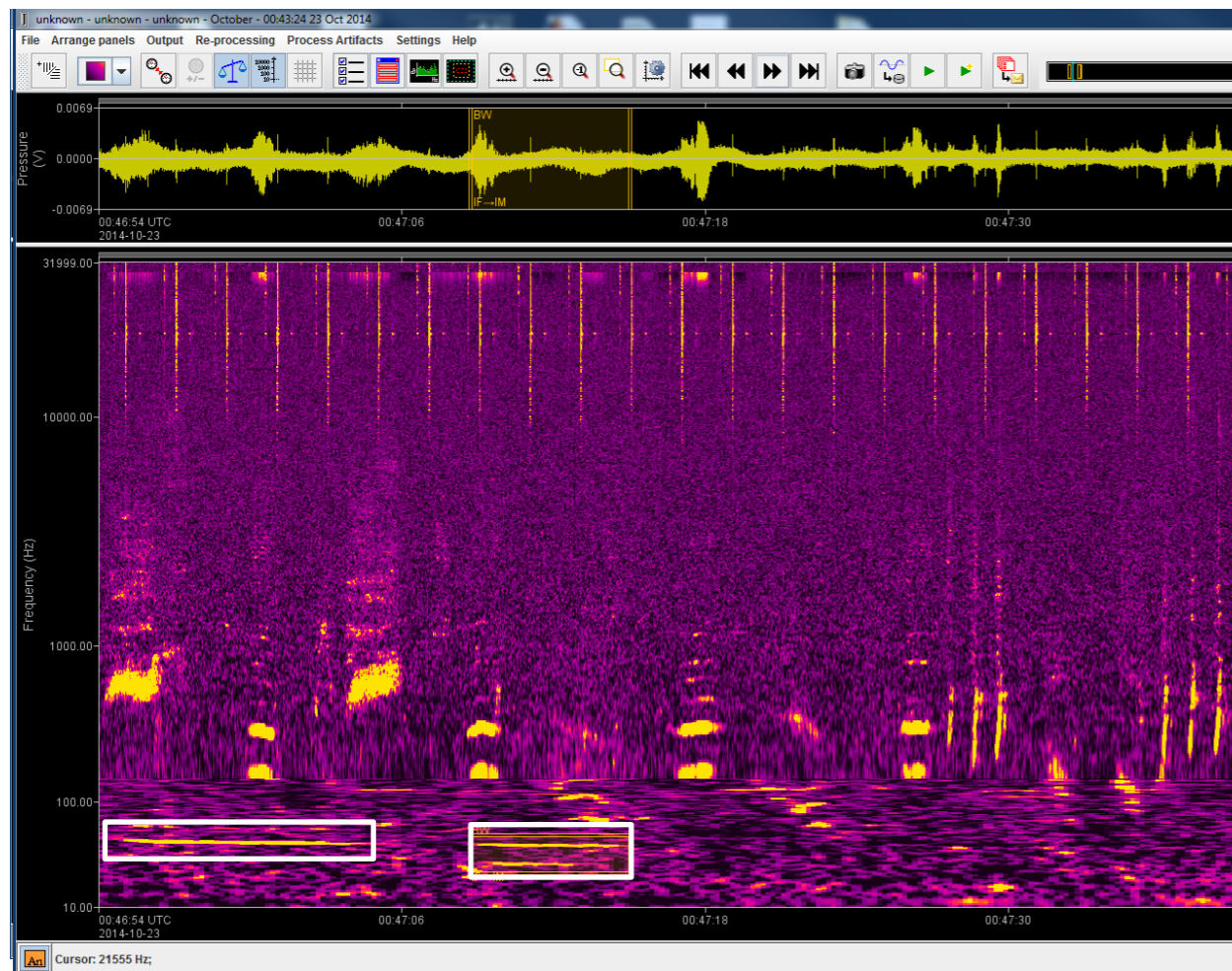
- Imperfect accuracy
- Novel signals missed
- Human intervention unnecessary for annotating likely events
- For human analyzed quality, manual effort still vastly reduced

JASCO COLLABORATION

- JASCO working on classifier to be run on all ONC acoustic data
- The trade: I can use their classifier to annotate my thesis data in exchange for manual annotations

JASCO COLLABORATION

- Protocol: Manually annotate alternate files for the first 4 days of each month for 1 year in SpectroPlotter



JASCO COLLABORATION RESULTS

- Humpbacks year-round!?
- Fin and blue whales
- **77%** of files had marine mammal vocalizations
- Most files had multiple species

OTHER ACOUSTIC WORK AT BARKLEY

In House:

- Patterns of marine mammal vocalizations in relation to environmental variables
- Collaboration with Baum-Juanes lab on fish behaviour
- Collaboration with Dr. Hervé Glotin on humpback whale stock definition

Independent:

- Other classifiers being built using our data
- Orca call catalog composition for Offshores and Outer Coast Biggs by Dr. John Ford
- Sperm whale habitat usage by Elizabeth Ferguson

SUGGESTED IMPROVEMENTS

- Implement classifiers
- Improve data mining functions to ease annotation searching
- Improve hydrophone viewer to better support work on different signal types
- Minimize active acoustic and mechanical interference
 - Distance
 - Debeeping

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Contact

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