Using the R/V Langseth Streamer System to Determine In-situ Airgun Power Levels

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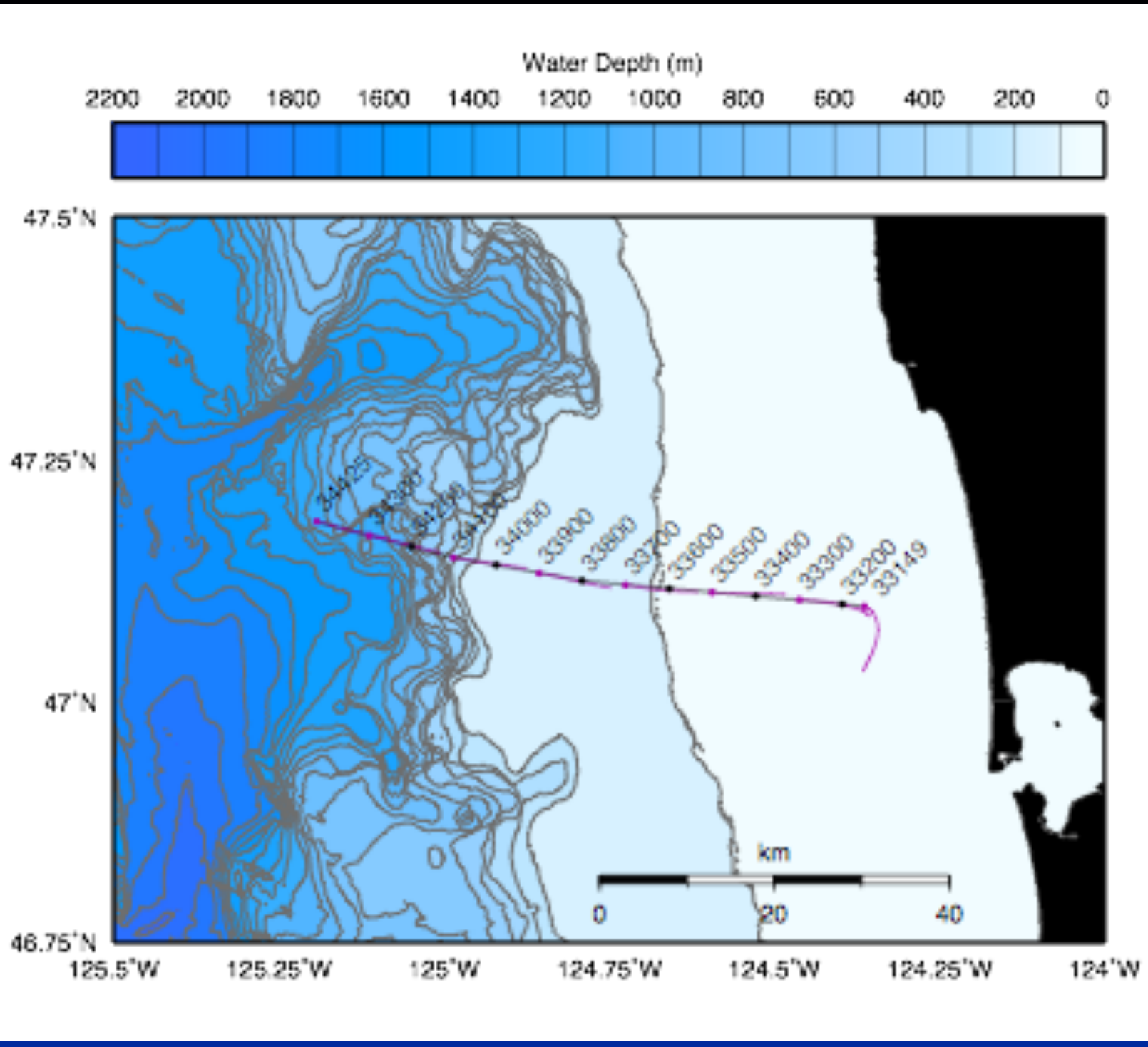
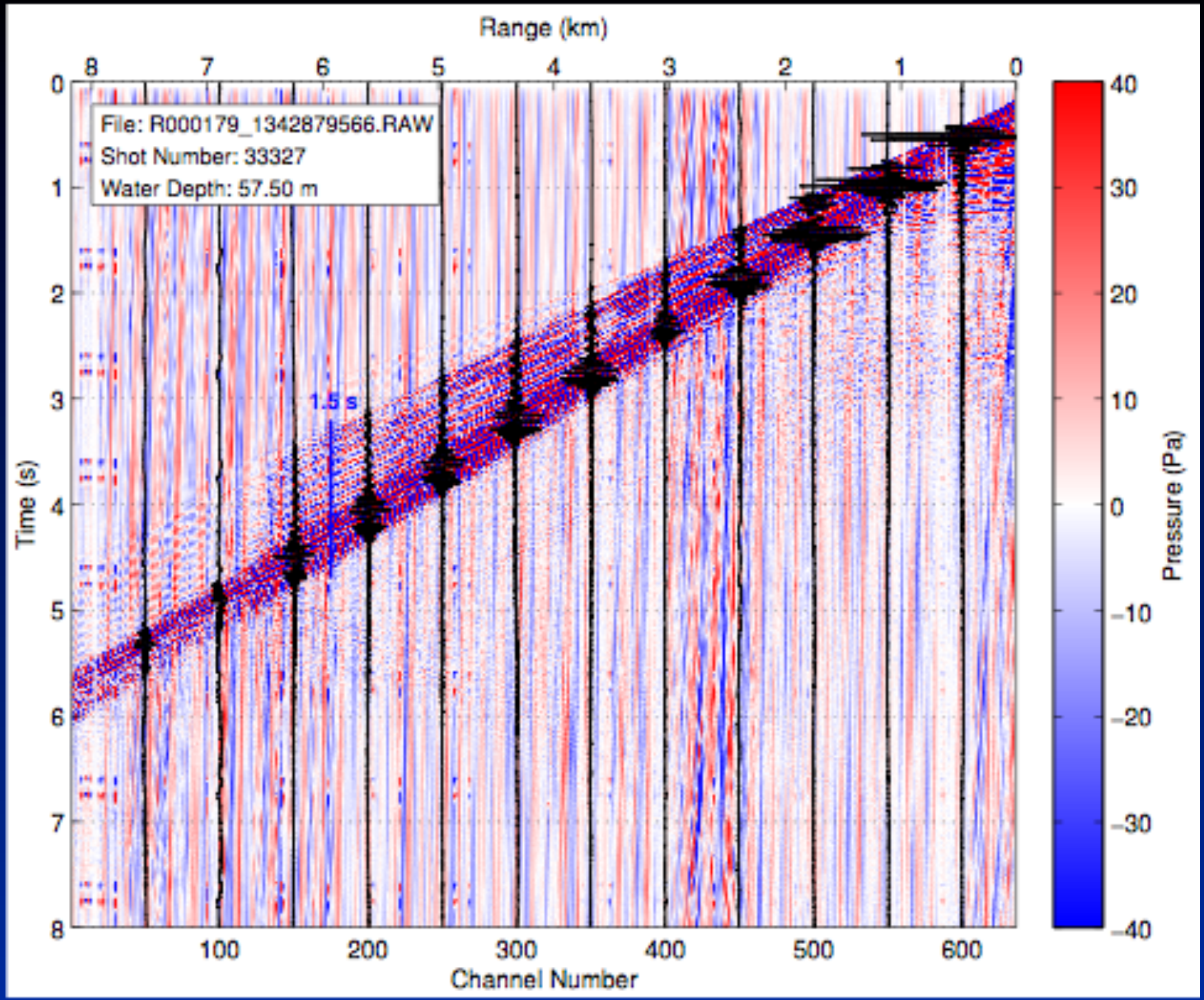
Outline

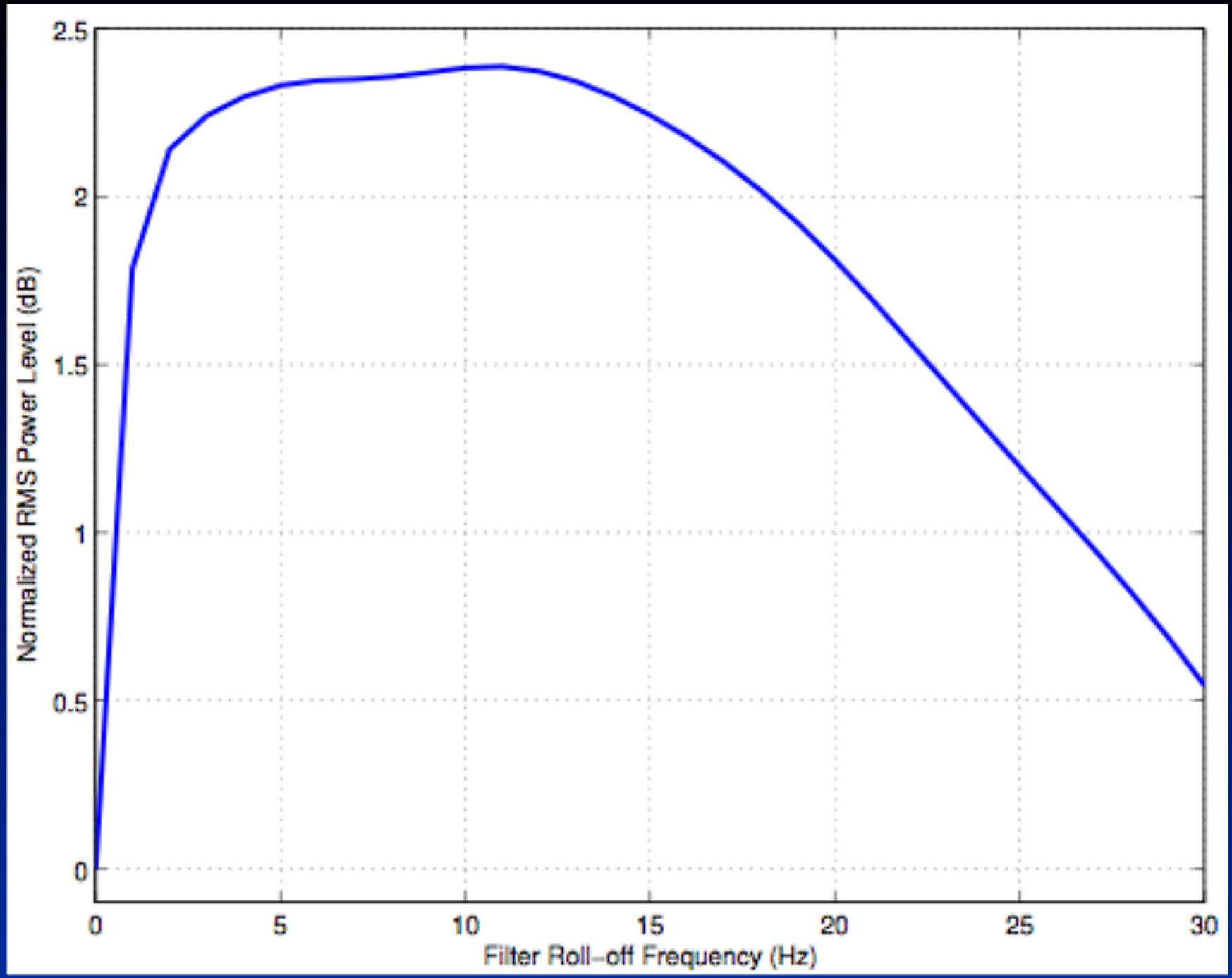
- *COAST transect - proof of concept*
- *Streamer data preparation*
- *RMS values along transect*
- *Safety radii*
- *Future directions*

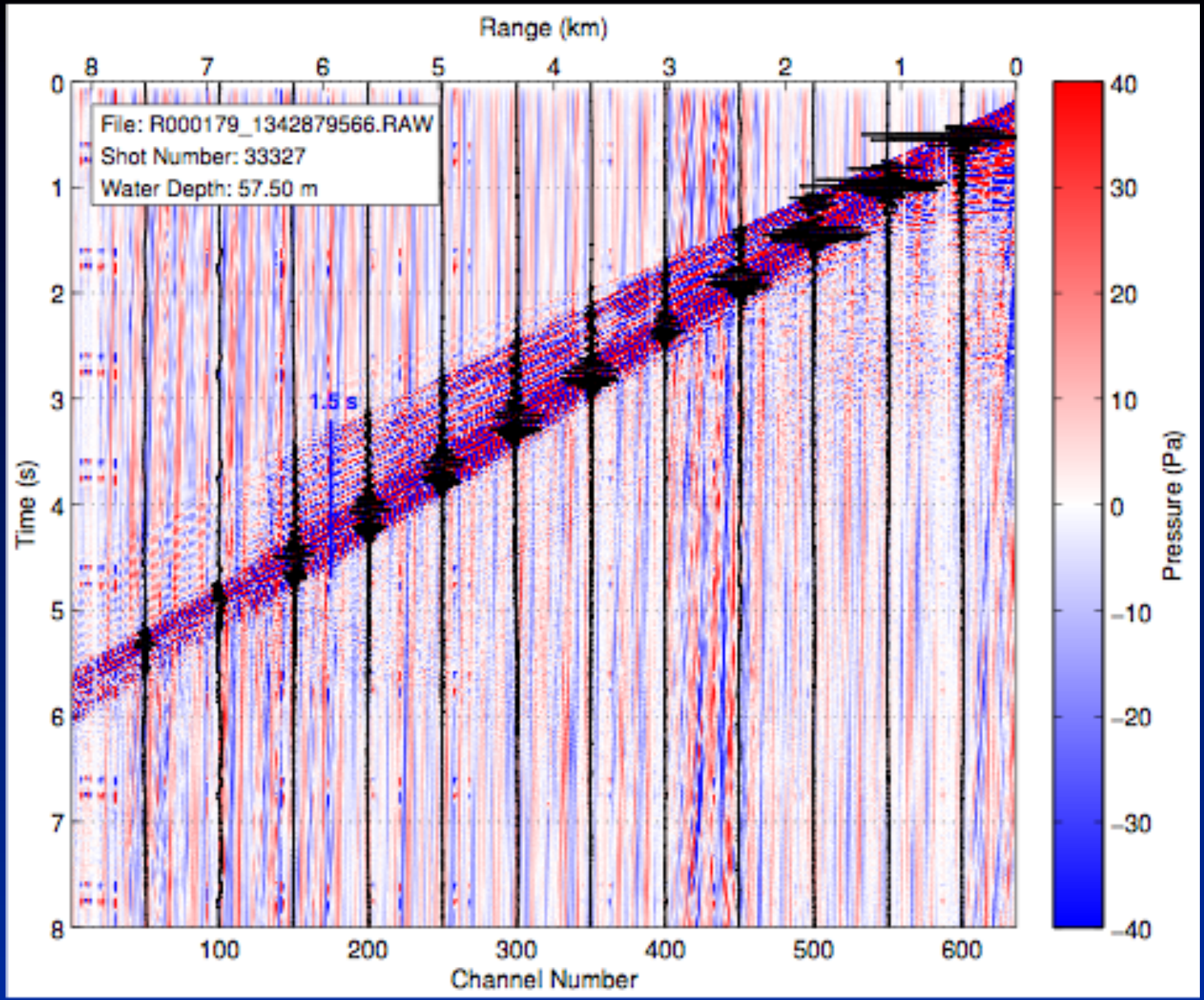
Cascadia Open-Access Seismic Transects and Ridge2Trench

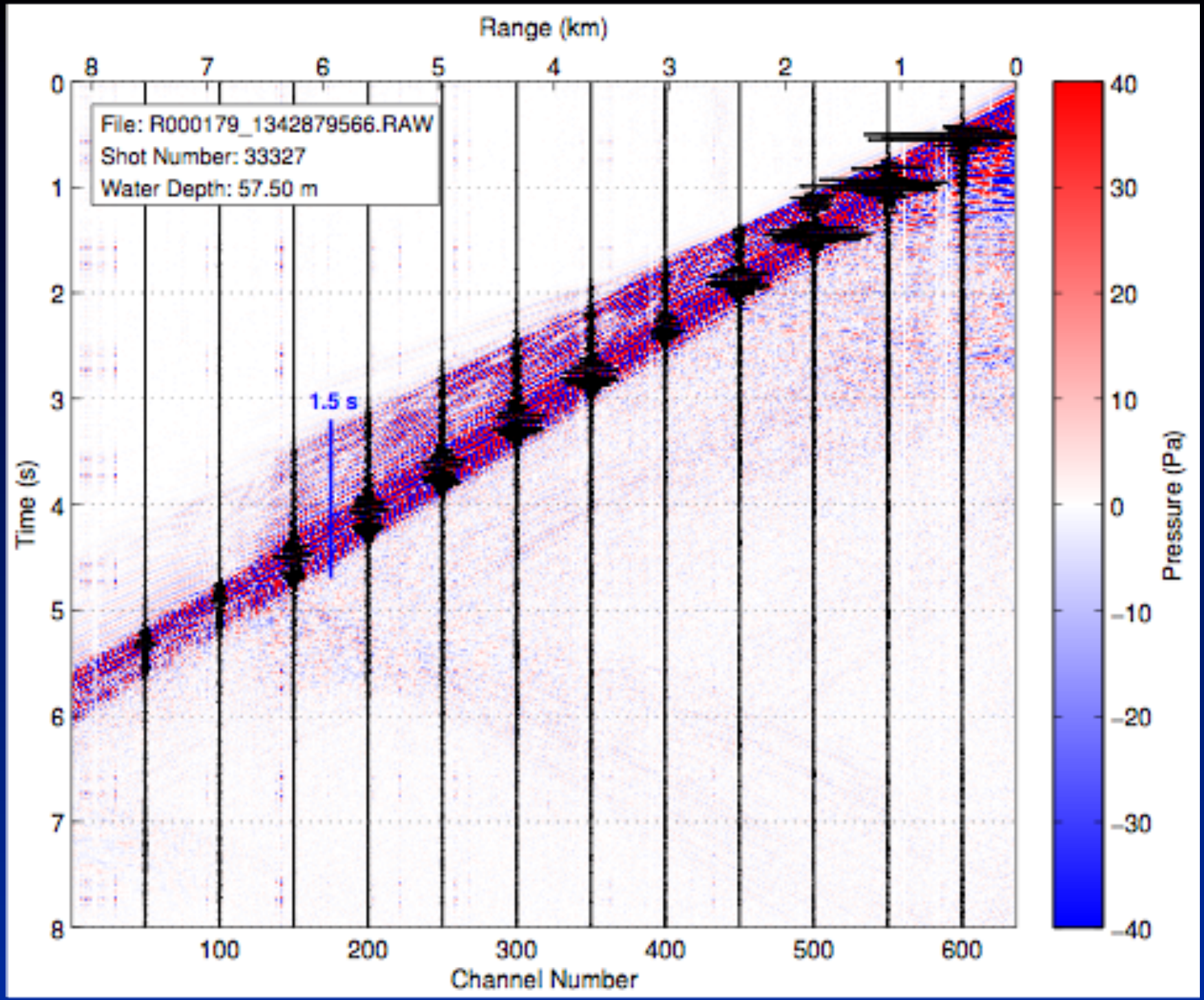

Water Depth (m)
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
47.5°N
47.25°N
47°N
46.75°N
125.5°W
125.25°W
125°W
124.75°W
124.5°W
124.25°W
124°W
34425
34200
34050
33900
33800
33700
33600
33500
33400
33300
33200
33149
km
0
20
40

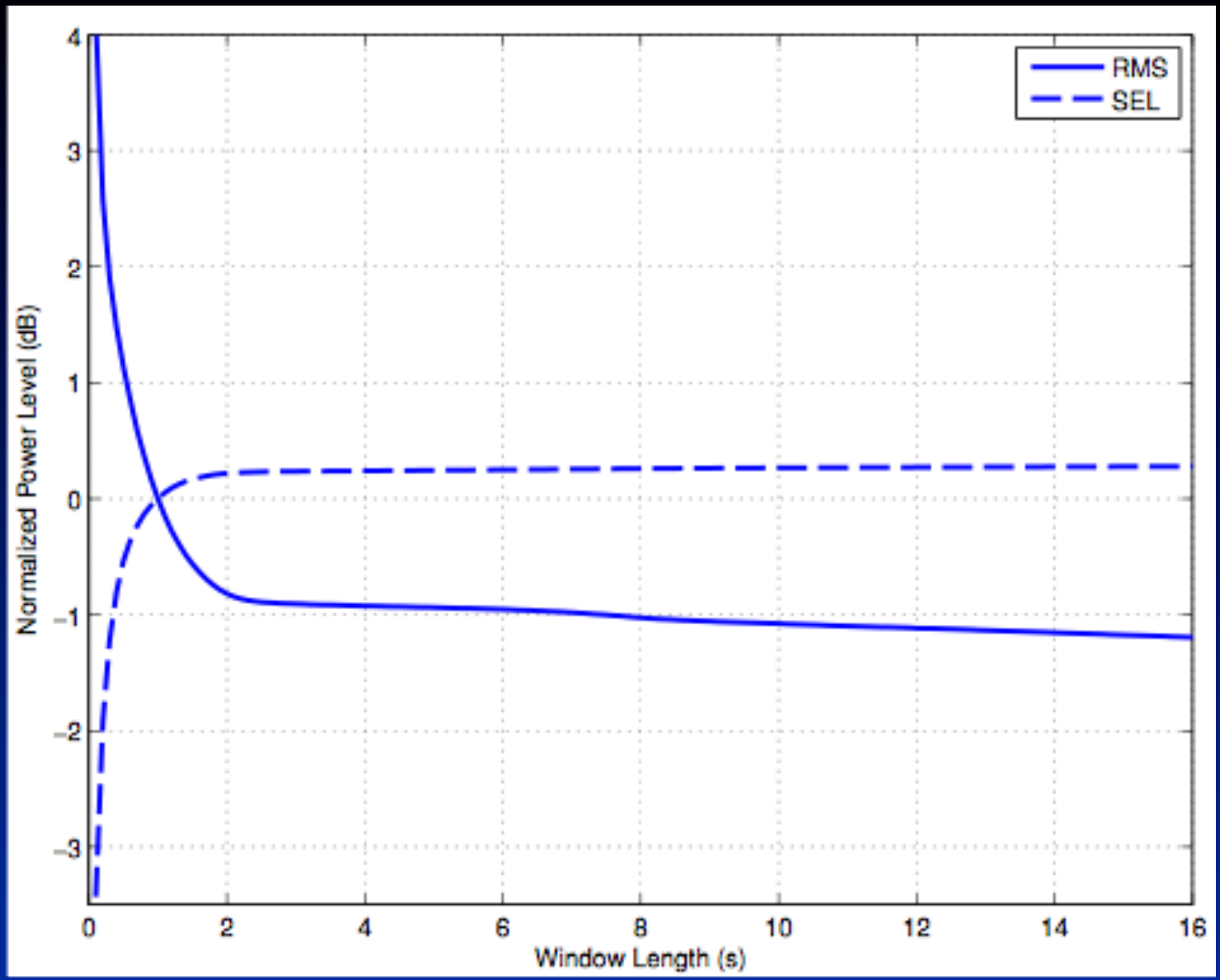
Streamer Data Preparation


Range (km)
8
7
6
5
4
3
2
1
0
File: R000179_1342879566.RAW
Shot Number: 33327
Water Depth: 57.50 m
1.5 s
Time (s)
0
1
2
3
4
5
6
7
8
100
200
300
400
500
600
Channel Number
40
30
20
10
0
−10
−20
−30
−40
Pressure (Pa)

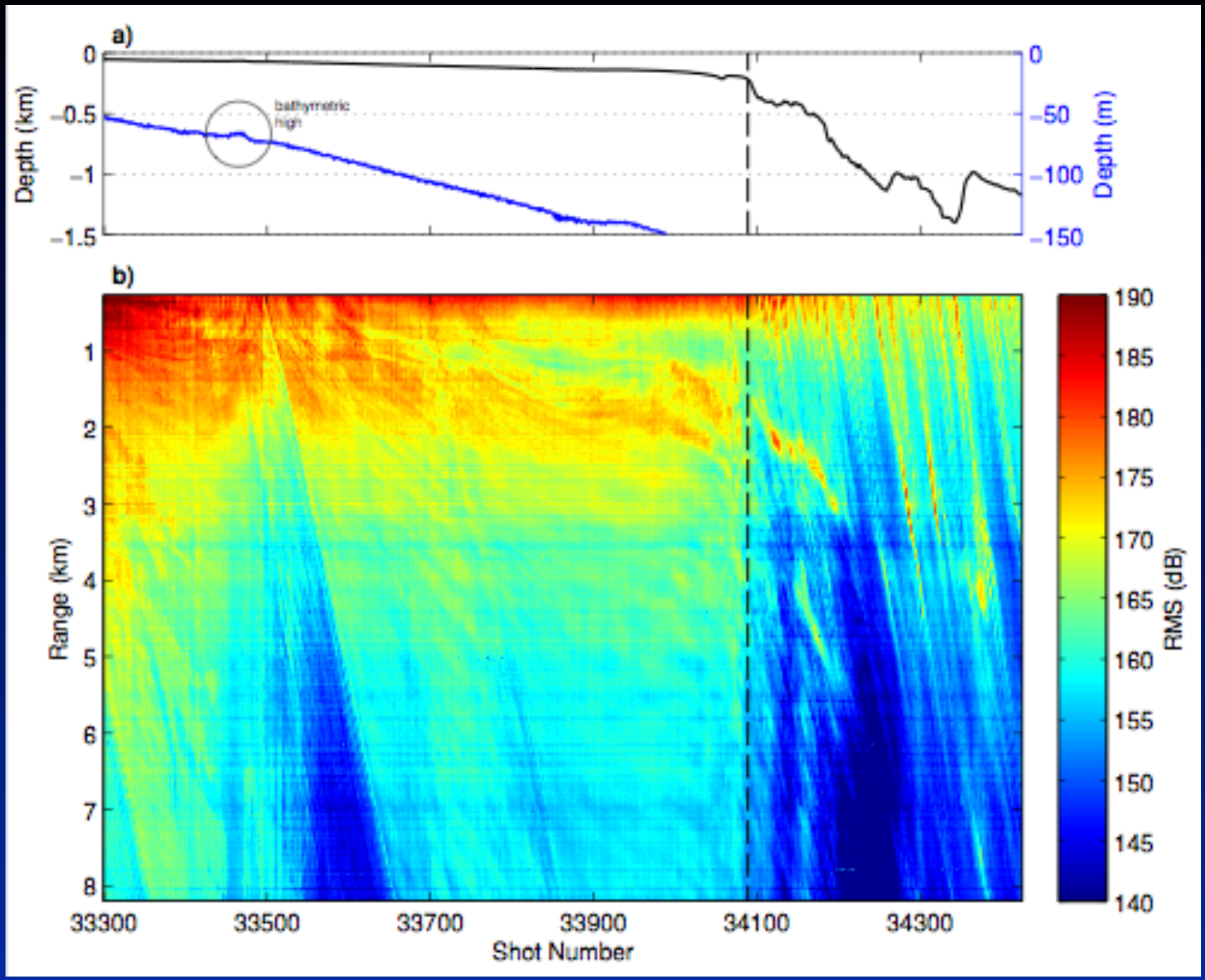

Normalized RMS Power Level (dB)
2.5
2
1.5
1
0.5
0
0
5
10
15
20
25
30
Filter Roll−off Frequency (Hz)


Range (km)
8
7
6
5
4
3
2
1
0
File: R000179_1342879566.RAW
Shot Number: 33327
Water Depth: 57.50 m
1.5 s
Time (s)
0
1
2
3
4
5
6
7
8
100
200
300
400
500
600
Channel Number
40
30
20
10
0
−10
−20
−30
−40
Pressure (Pa)

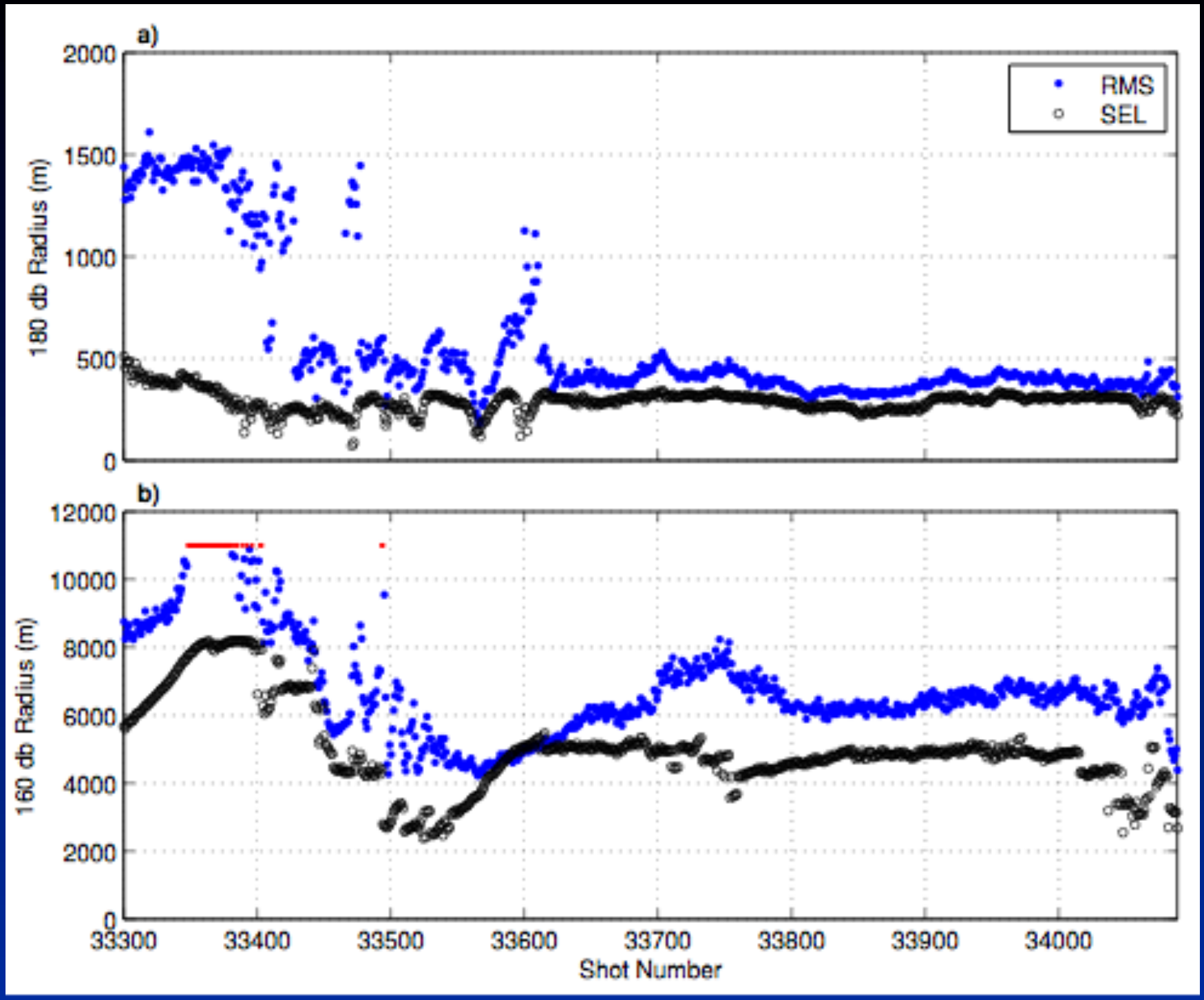

Range (km)
8
7
6
5
4
3
2
1
0
File: R000179_1342879566.RAW
Shot Number: 33327
Water Depth: 57.50 m
1.5 s
Time (s)
0
1
2
3
4
5
6
7
8
100
200
300
400
500
600
Channel Number
40
30
20
10
0
−10
−20
−30
−40
Pressure (Pa)


RMS
SEL
Normalized Power Level (dB)
Window Length (s)
4
3
2
1
0
−1
−2
−3
0
2
4
6
8
10
12
14
16

Power Levels


a)
Depth (km)
0
−0.5
−1
−1.5
bathymetric high
0
−50
−100
−150
Depth (m)
b)
Range (km)
1
2
3
4
5
6
7
8
33300
33500
33700
33900
34100
34300
Shot Number
190
185
180
175
170
165
160
155
150
145
140
RMS (dB)

Safety Radii


a)
2000
1500
1000
500
0
180 db Radius (m)
RMS
SEL
b)
12000
10000
8000
6000
4000
2000
0
160 db Radius (m)
33300
33400
33500
33600
33700
33800
33900
34000
Shot Number

More Information

Crone, T. J., M. Tolstoy, and H. Carton (2014), Estimating shallow water sound power levels and mitigation radii for the R/V Marcus G. Langseth using an 8 km long MCS streamer, Geochem. Geophys. Geosyst., 15, doi:10.1002/2014GC005420.

Future Research Directions

- *Explore other extant datasets from other shallow water cruises/environments (New Jersey, ENAM)*
- *Adapt methods for use with with next generation of marine mammal safety guidelines*
- *Conduct another shallow water calibration to further refine the technique and develop a real-time safety radius system*