Understanding Boat Noise on a Bottom Moored Recorder during SW06

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OUTLINE:

• High quality data show interesting pattern that needs to be understood
• Explanation through simple modeling
• Possible applications
Environment and Measurement Geometry

SW53  SHRU
39.054200 Lat
-73.062300 Lon

SHRU3 at 72.5 m
HARDWARE REQUIRED PER MOORING, WITHOUT SPARES

(1) 5/8" Anchor Shackles
(3) 1/2" Anchor Shackles
(0) 3/8" Anchor Shackles
(1) 1/2" Anchor Shackles
(0) 3/8" Sling Links

SH = Shackle
SL = Sling Link
SP = Screw Pin

HARDWARE DESIGNATION

(1) 1/2" SH
(1) 5/8" SH
(1) 5/8" SL
(1) 3/8" SH
(1) 3/8" SL
(1) 1/2" SH
(1) 3/8" Screw Pin
(1) 5/8" SH
(1) 3/8" SP
(2) 5/8 SL
(1) 3/8 SP
(1) 3/8 SP

10 m 3/16" Jac Nil Wire Rope

SCHRU
Single Channel Hydrophone Receiving Unit

3 m 3/8" Mooring Chain

400 lb Anchor

SHRU mounted on Rail Assembly

Bottom Depths of SCHRU Moorings

<table>
<thead>
<tr>
<th>Mooring</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW 49</td>
<td>64 m</td>
</tr>
<tr>
<td>SW 50</td>
<td>67 m</td>
</tr>
<tr>
<td>SW 51</td>
<td>84 m</td>
</tr>
<tr>
<td>SW 52</td>
<td>103 m</td>
</tr>
<tr>
<td>SW 53</td>
<td>78 m</td>
</tr>
</tbody>
</table>

Single Channel Hydrophone Receiving Unit
Moorings SW 49 - SW 53
SHALLOW WATER 2006
Observations of the spectrogram:

1. High signal-to-noise
2. Curved pattern
3. Fading to the right
V/C \approx 1\% \text{ from Doppler Shift}
OASES Modeling
2 – 5000 Hz, $\delta f = 1$ Hz

Receivers at 0.5 m depth

Source at 72.5 m

Half-space bottom
$C = 1610$ m/s, $\rho = 2$
OASES Modeling

2 – 5000 Hz, \( \delta f = 1 \) Hz

Receivers at 0.5 m depth

Source at 72.5 m

Half-space bottom

\[ C = 1610 \text{ m/s}, \rho = 2000 \text{ km/m}^3 \]
OASES Modeling
2 – 5000 Hz, $\delta f = 1$ Hz

Receivers at 0.5 m depth

Source at 72.5 m

Half-space bottom
$C = 1610$ m/s, $\rho = 2$
Using rays to calculate pattern
Optimization: \( T = \sqrt{ \frac{x^2 - d^2}{v}} \)

- \( d \): CPA
- \( v \): boat speed
Summary and Possible Applications

- Result sensitive to $v$ (12 ± 0.25 m)
- Insensitive to $d$ (5 – 30 m)
- Very sensitive to receiver depth

- Geoacoustic inversion – research needed
- Monitoring – consider reverse the role of boat and recorder
Summary and Possible Applications

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Pattern depth difference between two bottom types
Summary and Possible Applications

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- Geoacoustic inversion – research needed
- Monitoring – consider reverse the role of boat and recorder
Reciprocity between source and receivers

vehicle at 72.5 m