

An *in situ* sediment sound speed
measurement platform:
Design, operation, and experimental results

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Williams

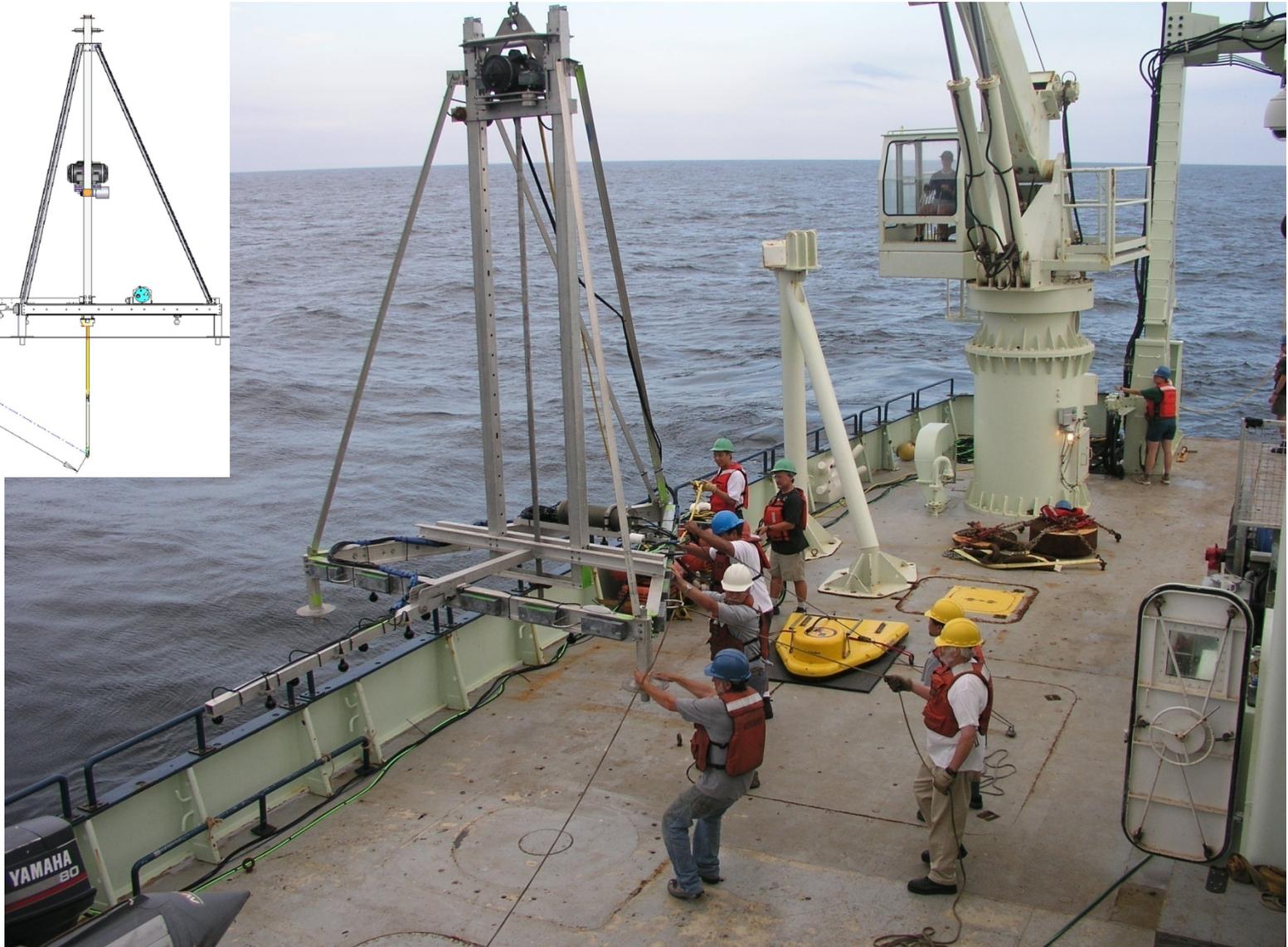
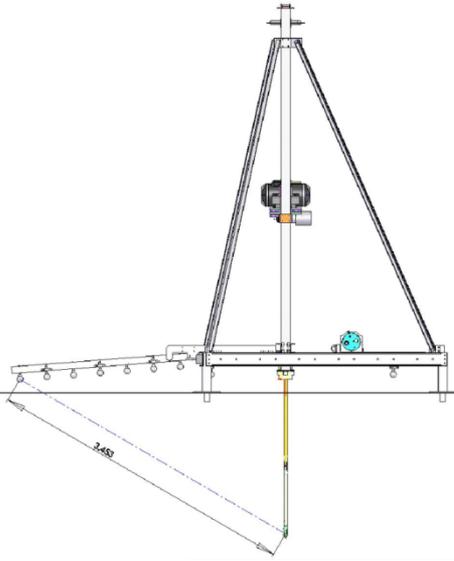
Outline

- The design of the Sediment Acoustic-speed Measurement System (SAMS)
- Field measurement at SW06
- Data analysis and results for SW06
- Summary and future directions

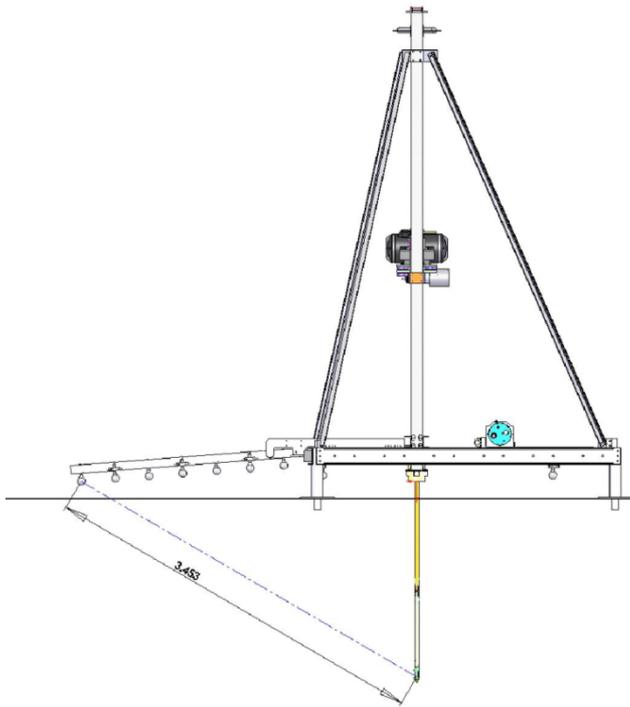
The design of SAMS

- Scientific goal:
Obtain *in situ* geoacoustic properties of the seabed within the topmost 3 meters.
- Design philosophy:
Measurements at precise depth with minimum intrusion.

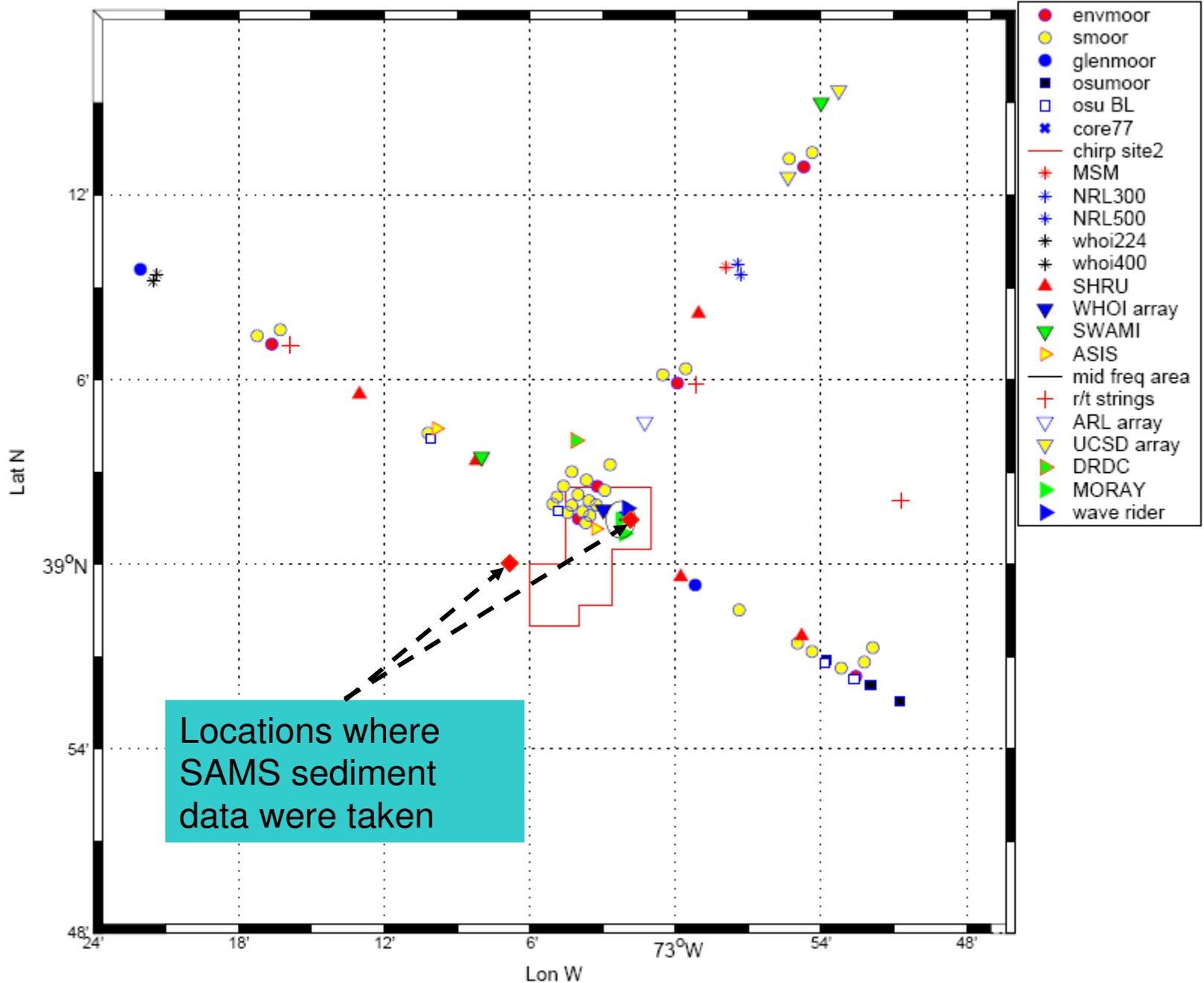
Deployment during SW06 off New Jersey coast



A view at the sea bottom...



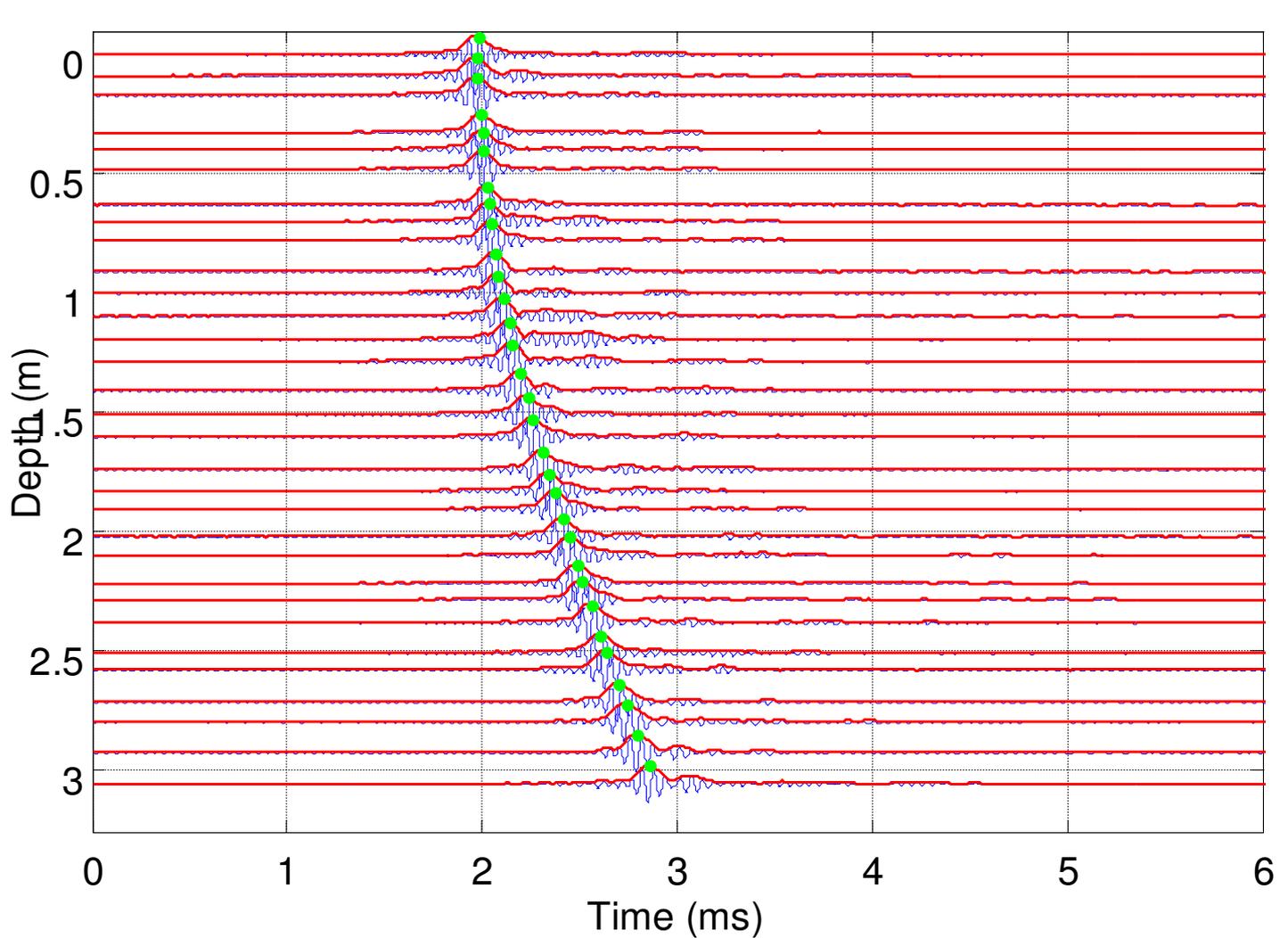
All PO and Acoustics mooring positions



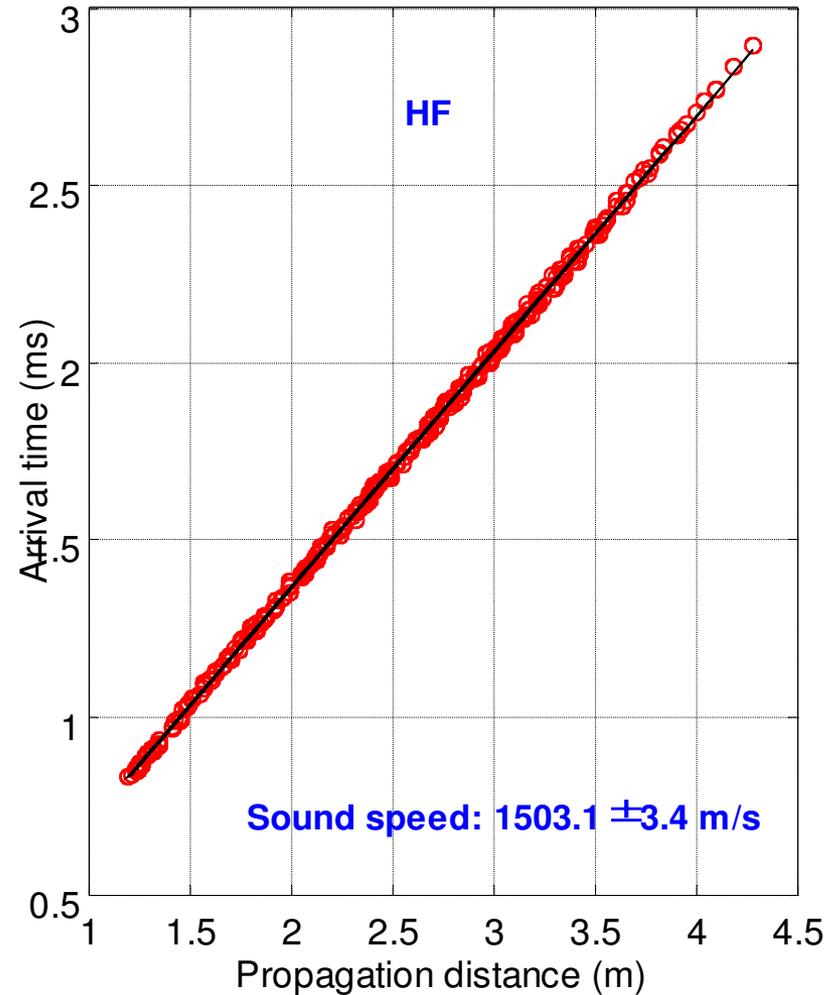
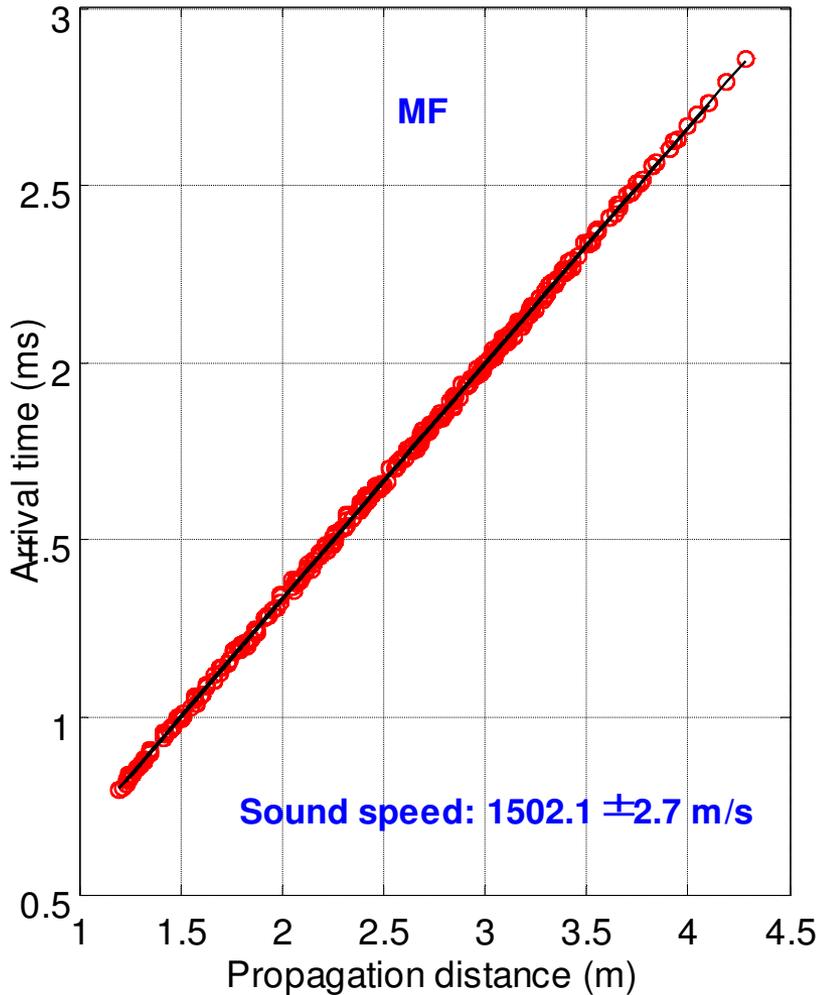
Field Data

- Four data sets: one for calibration; three in sediments at different locations (1 and 2 are close to each other)
- Three frequency bands: 2-11 kHz, 10-21 kHz, and 20-35 kHz (referred to as LF, MF and HF)
- Sediment maximum penetration depth for all three deployments: 1.6 meters

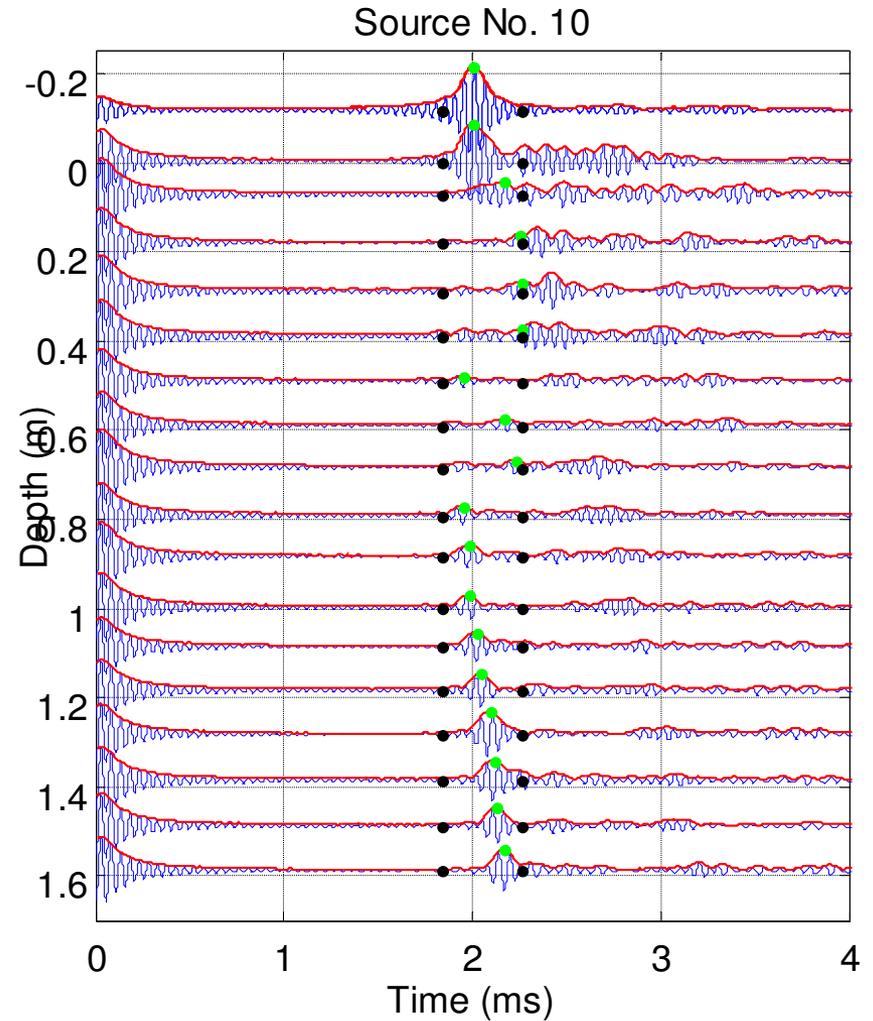
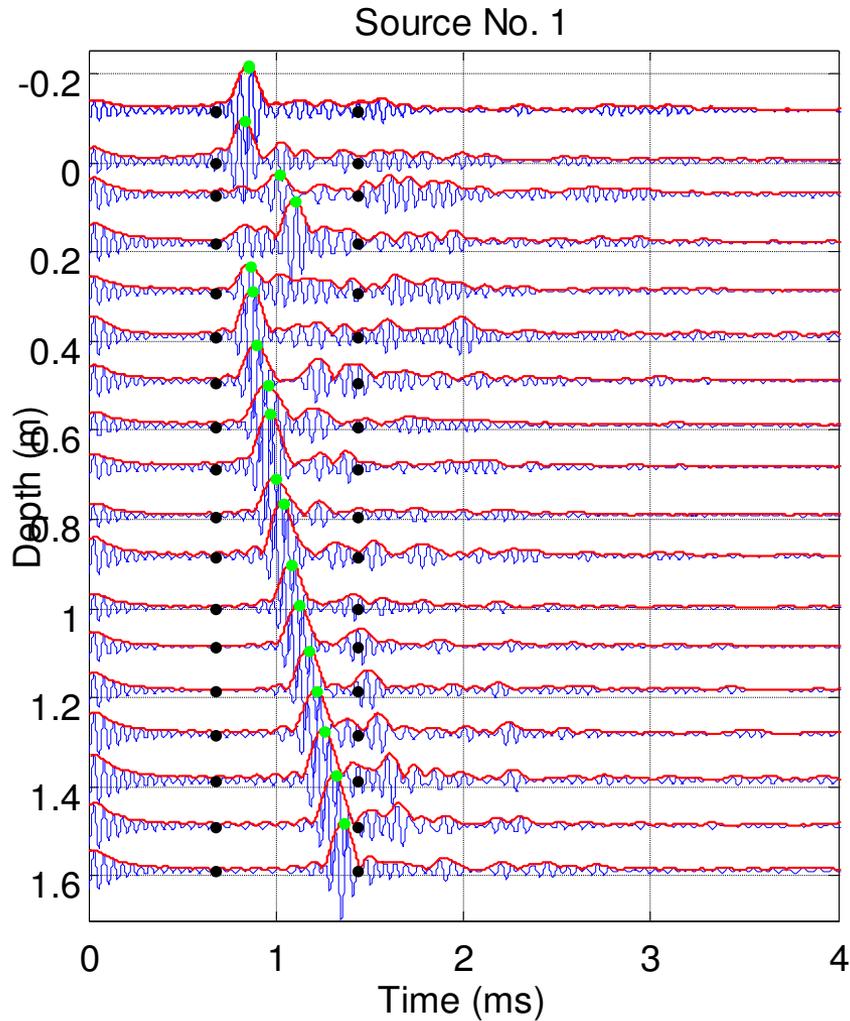
Calibration data: waveforms received from source No. 10 at MF



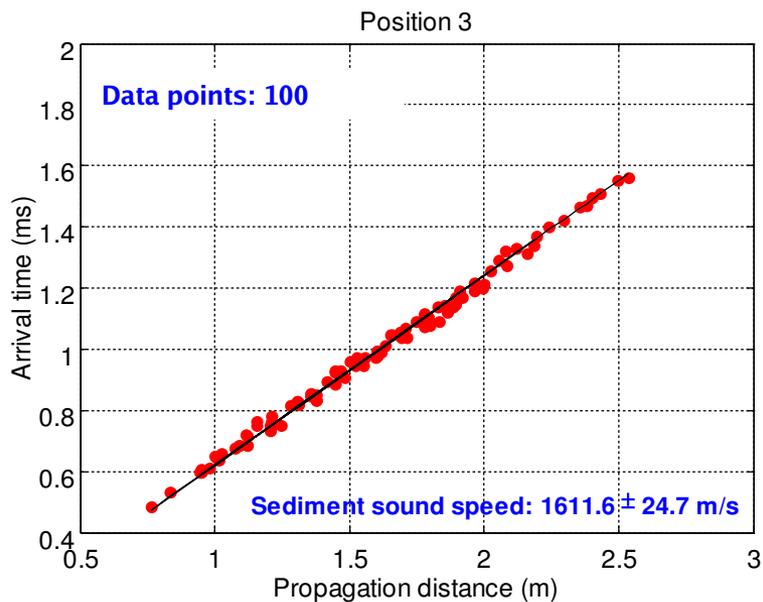
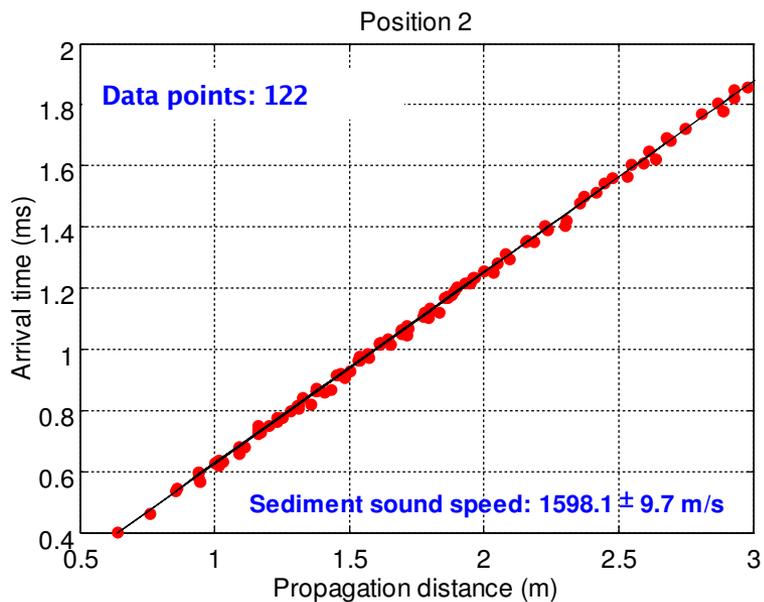
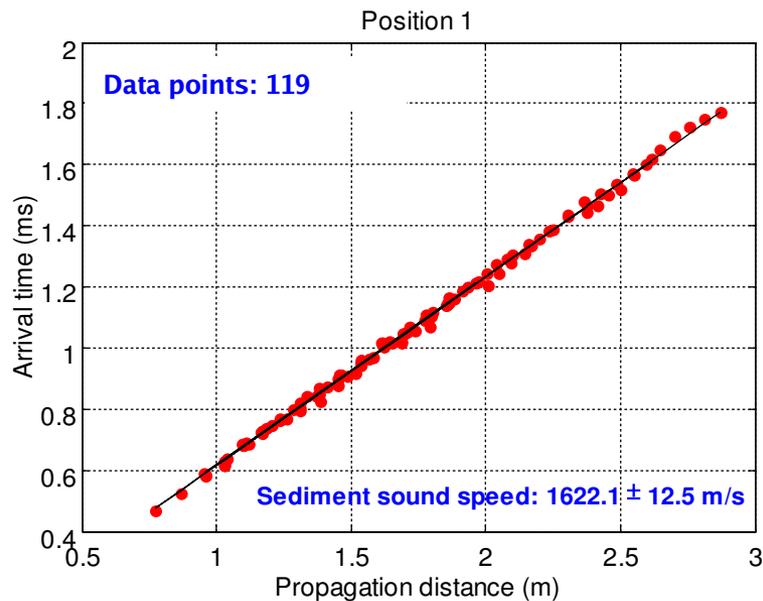
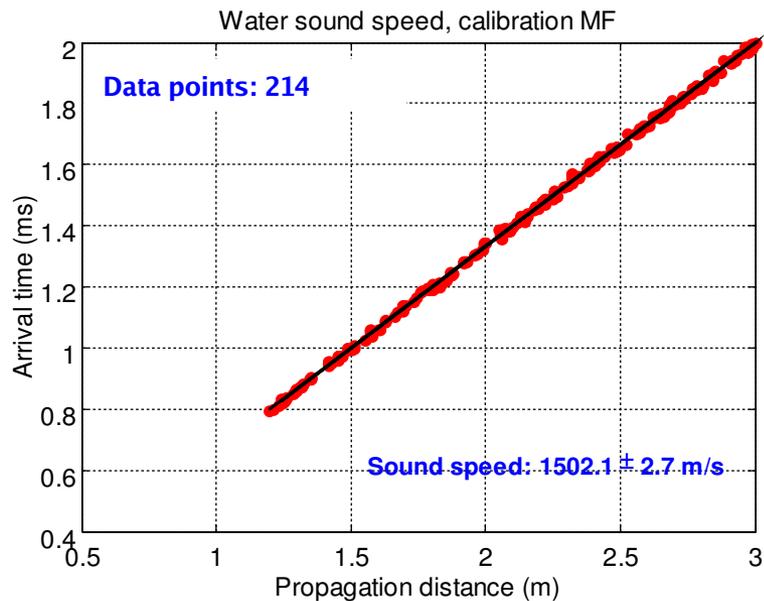
Water sound speeds determined from calibration data



Sediment data: waveforms received for sources No. 1 and 10 at MF, 2nd deployment

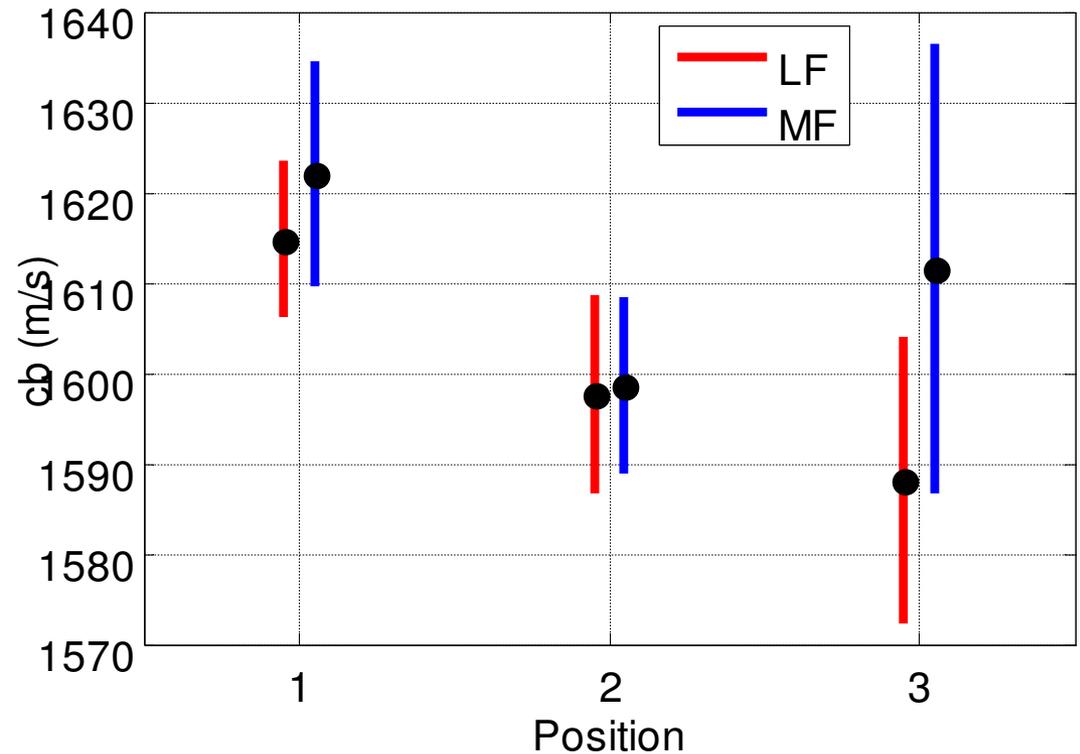


Comparison of curve fitting results between sediment and calibration data



Sediment sound speed results

		C _b (m/s)
Position 1	LF	1614.8 ± 8.7
	MF	1622.1 ± 12.5
Position 2	LF	1597.7 ± 11.0
	MF	1598.1 ± 9.7
Position 3	LF	1588.2 ± 15.8
	MF	1611.6 ± 24.7

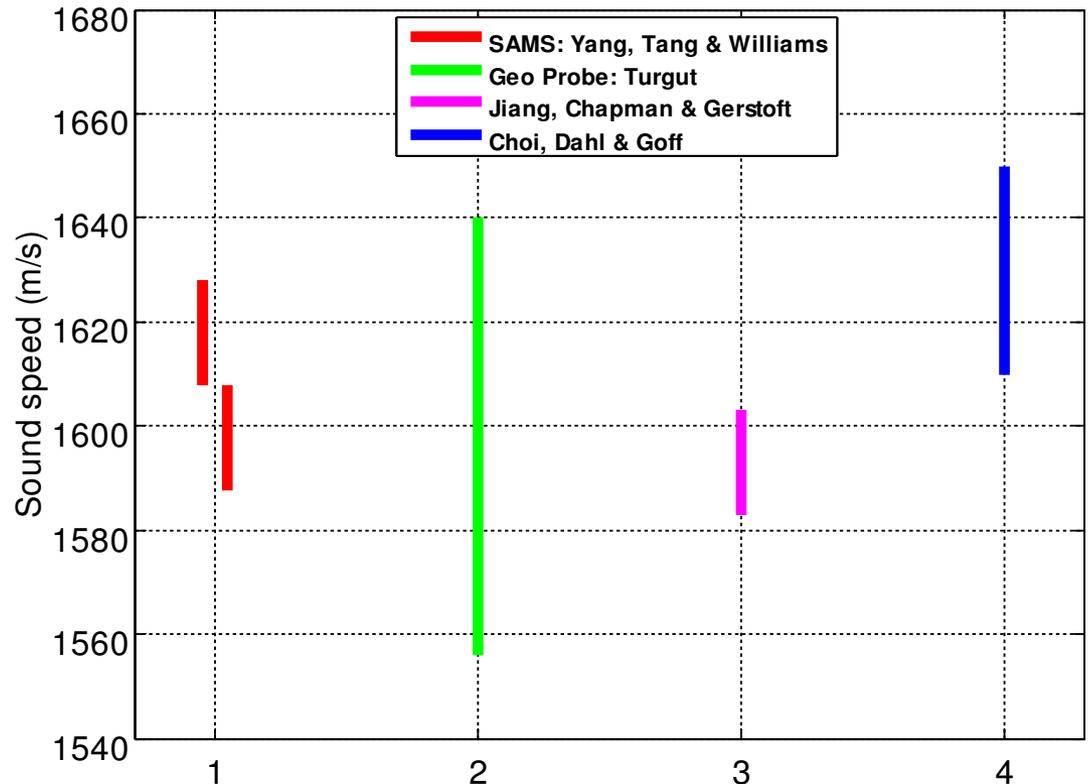
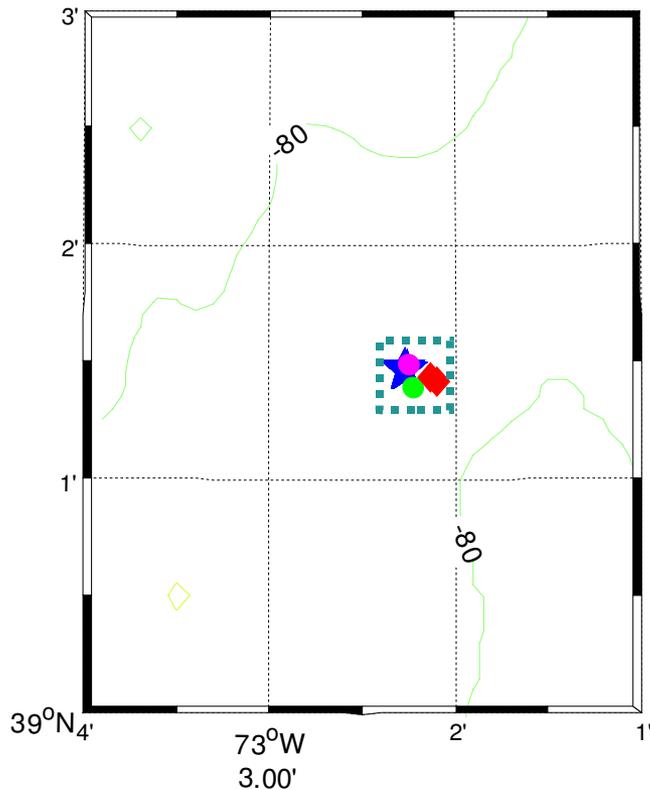


Direct measurement and geoacoustic inversion of sediment sound speed in SW06

1 km boxed area:

◆ SAMS (direct, APL-UW):
 1618 ± 11
◆ Jiang, Chapman & Gerstoft:
 1598 ± 10
◆ SAMS (direct, APL-UW):
 1594 ± 11

● Geo Probe (direct, Turgut):
1550, 1605, 1640
★ Choi, Dahl & Goff:
1630 \pm 20

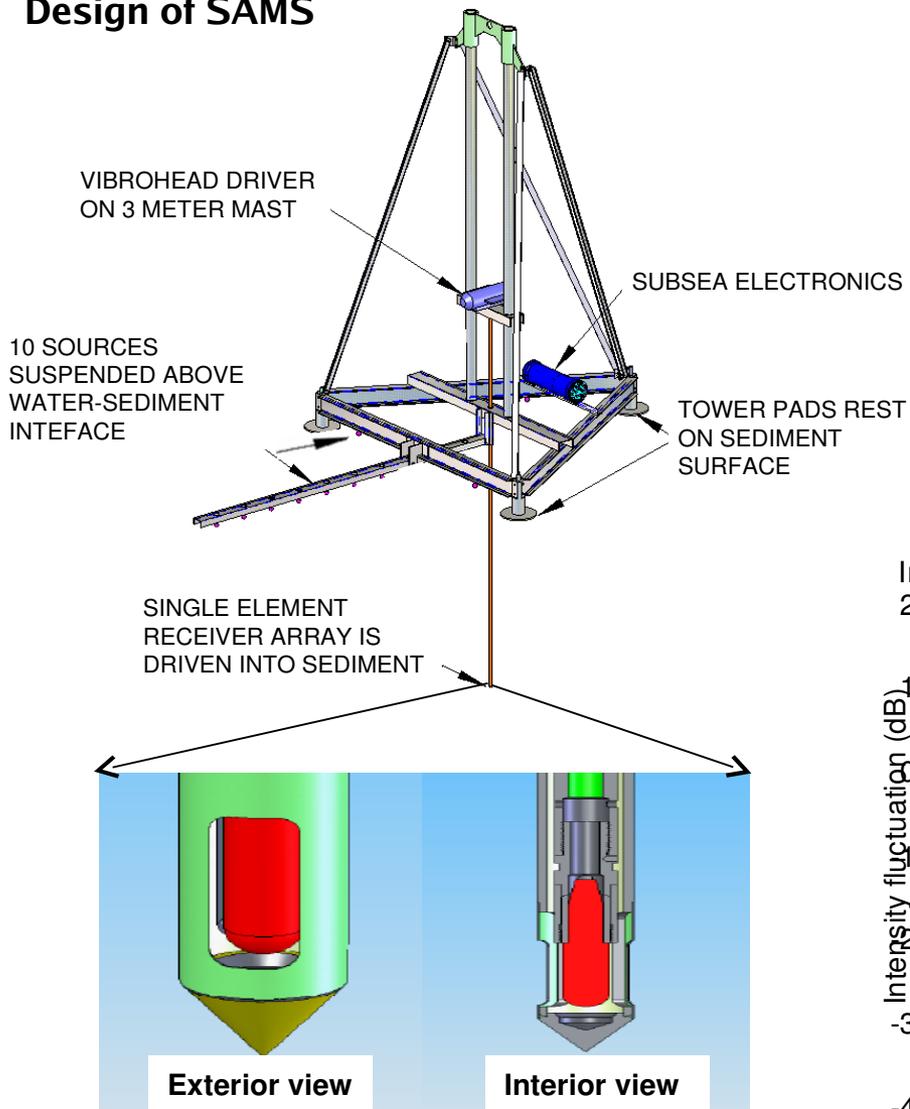


Summary

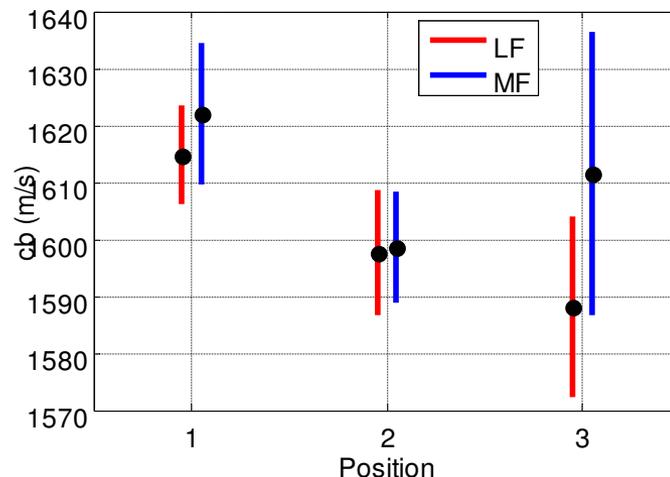
- The overall system uncertainty is 3 m/s from the calibration data.
- The sediment sound speeds found at positions 1, 2, and 3 are 1618 ± 11 , 1598 ± 10 , and 1600 ± 20 m/s respectively.
- The sediment sound speed is homogeneous within the top 1.6 meters.
- Little dispersion in sediment sound speed was observed.

SAMS: work accomplished in SW06 and work as future directions

Design of SAMS



In situ sediment sound speed in SW06



In situ sediment attenuation for future studies

