Offshore Seismic Exploration
Presented to:
BC Seafood Alliance February 17, 2004

Doug Bogstie
Marketing Manager
WesternGeco

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GECO DIAMOND

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Presentation Outline

- Seismic Acquisition Fundamentals
- Acquisition Footprint
- Seismic Data
- Marine Seismic Source
- Streamers
- Mackenzie River 2002 Test
- Mitigation Measures
- Questions

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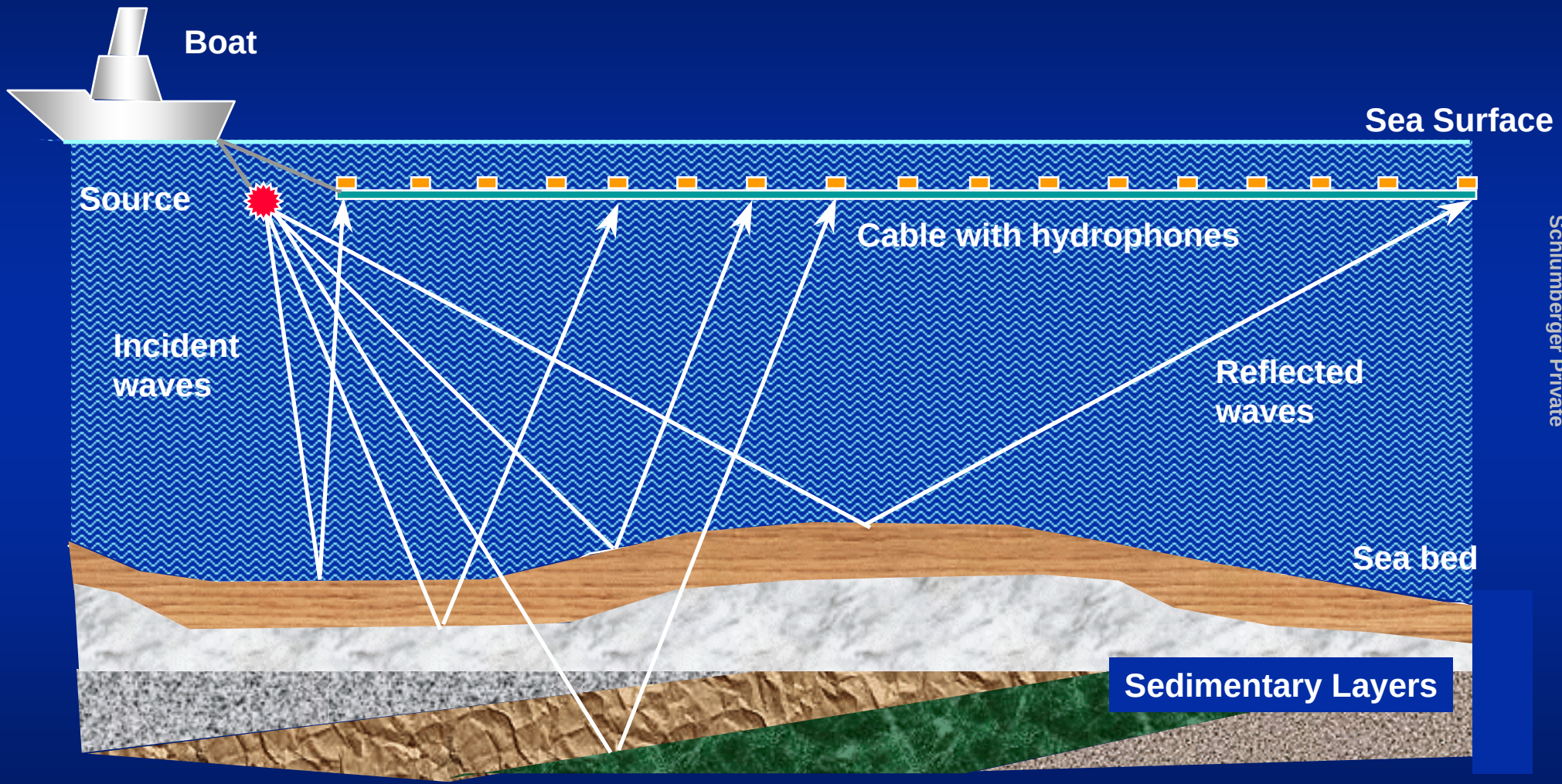
Marine Acquisition System



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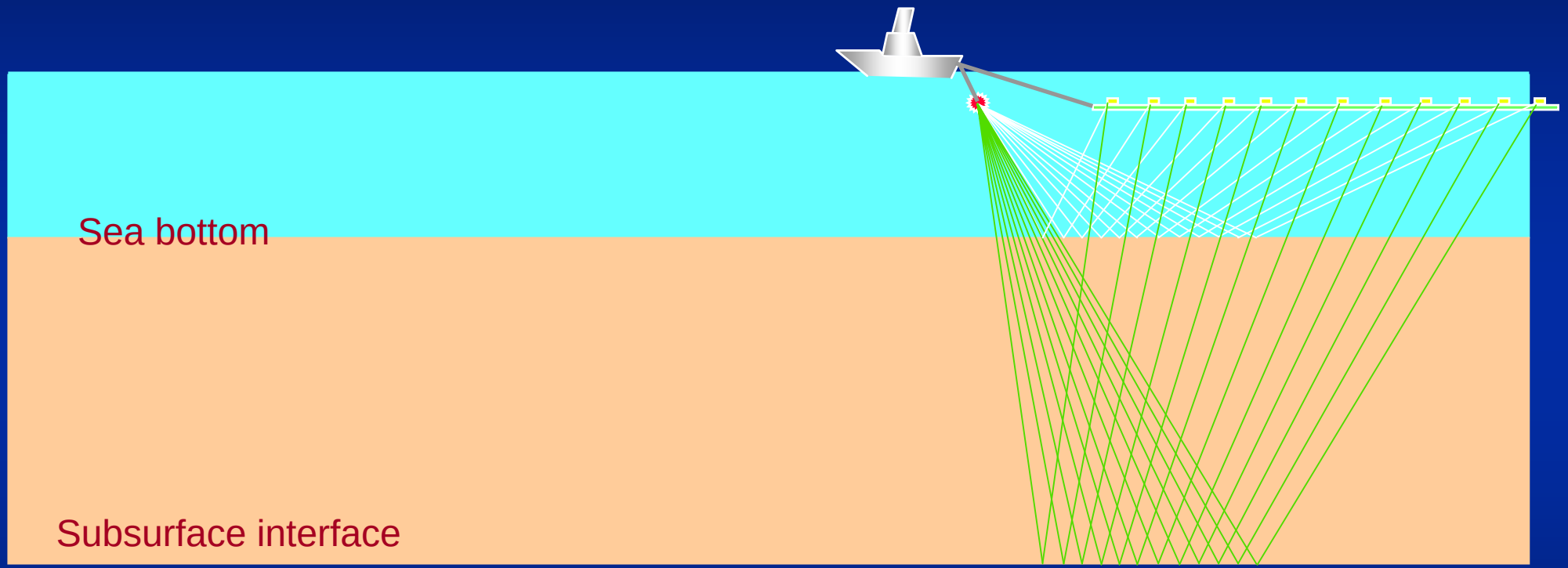
MARINE ACQUISITION



Common Shot gather

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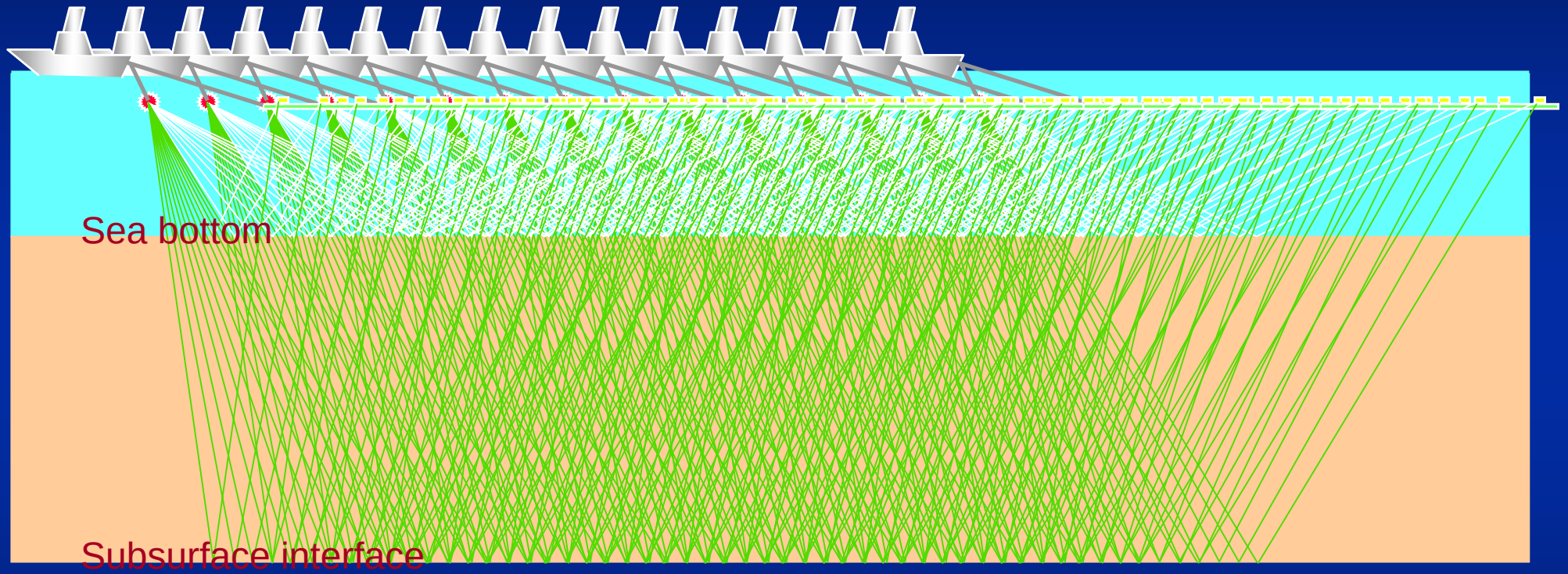
MARINE ACQUISITION



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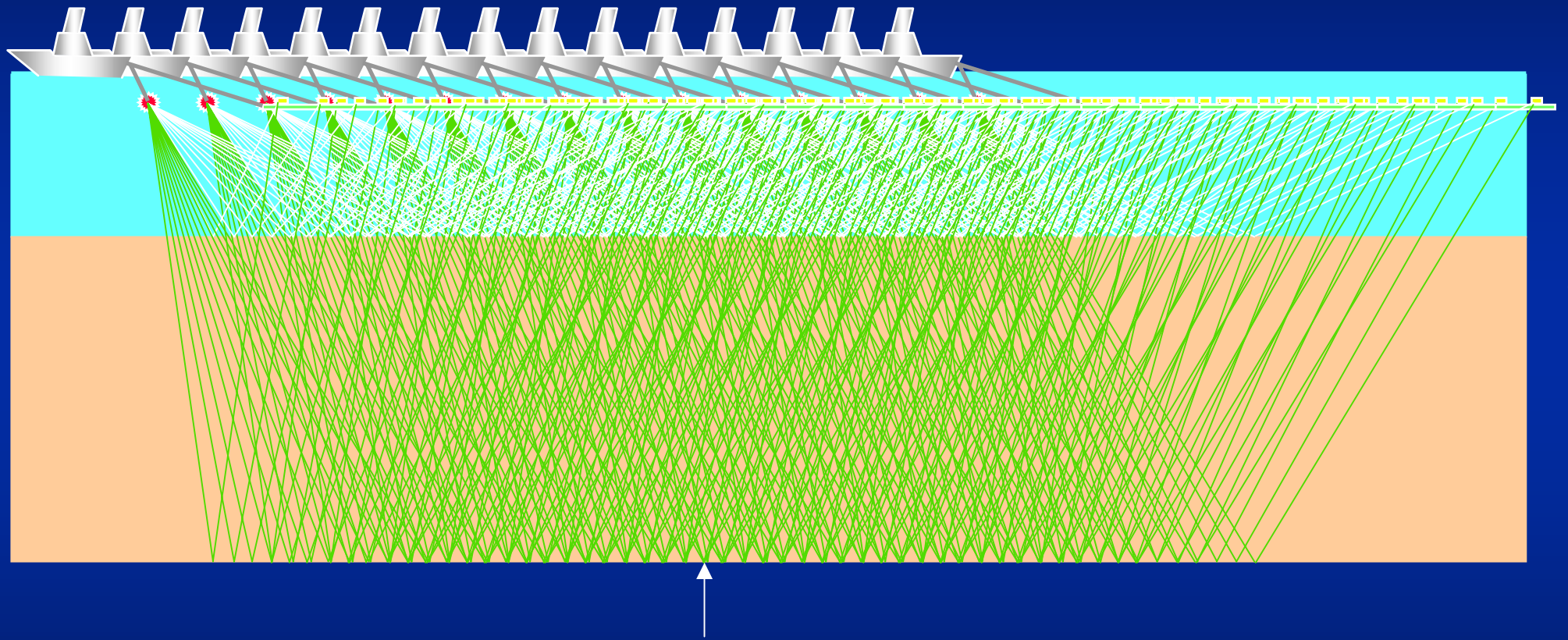
MARINE ACQUISITION



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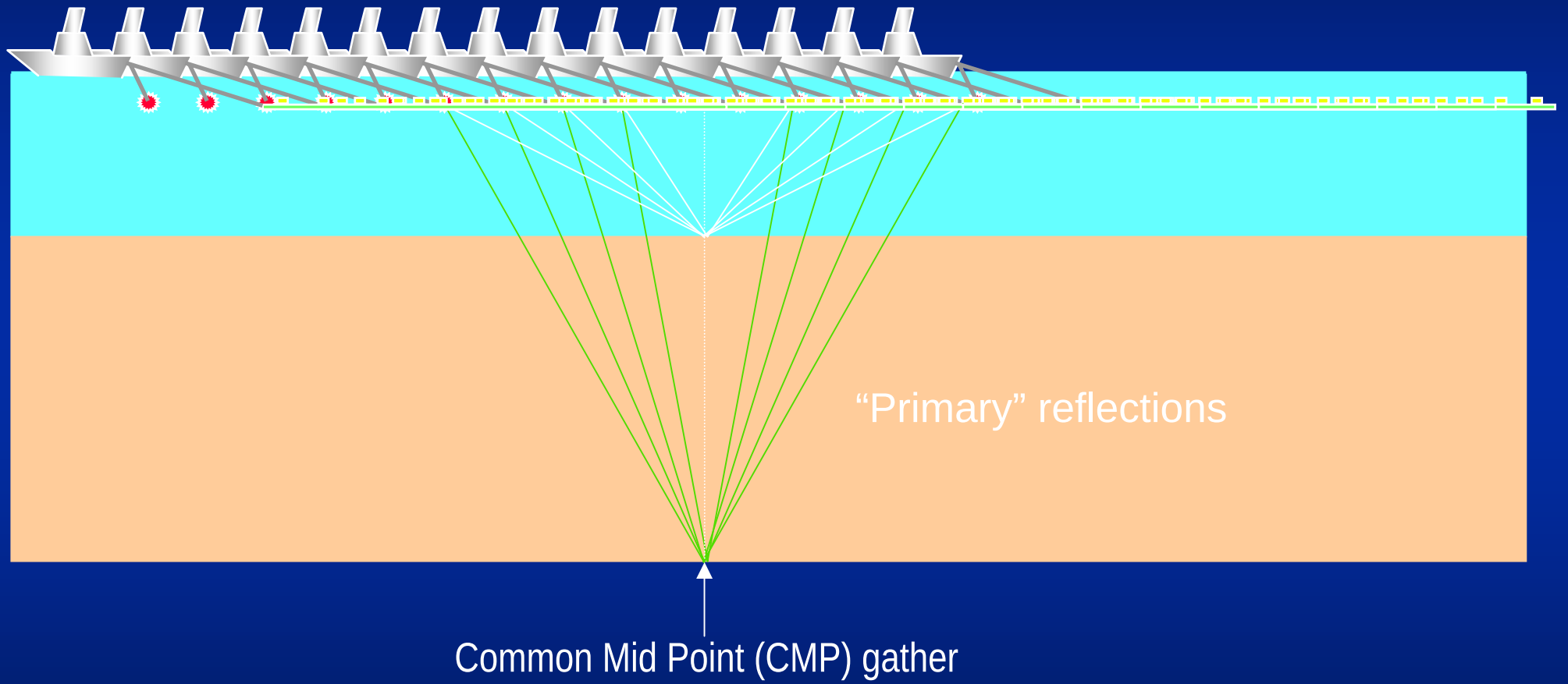
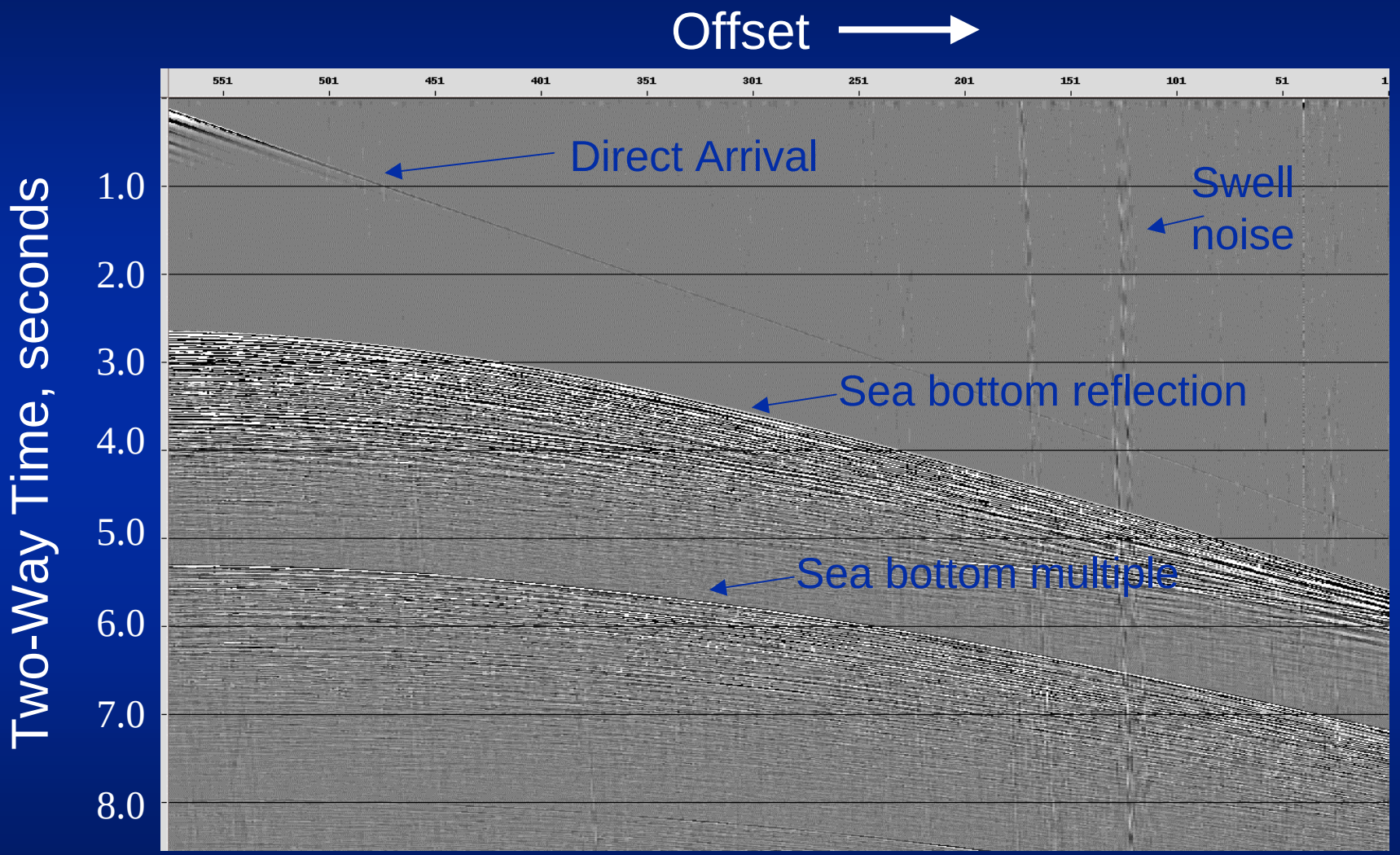
COMMON MID POINT GATHER



COMMON SHOT GATHER



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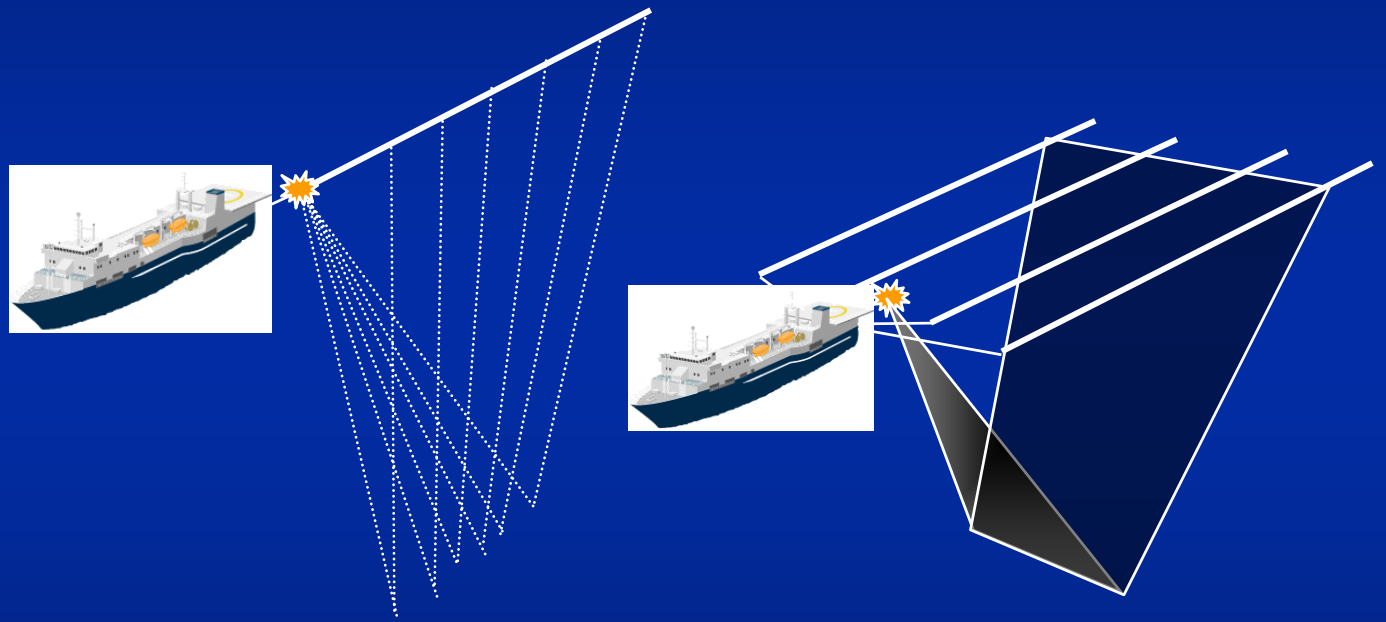
2D vs 3D Marine Seismic



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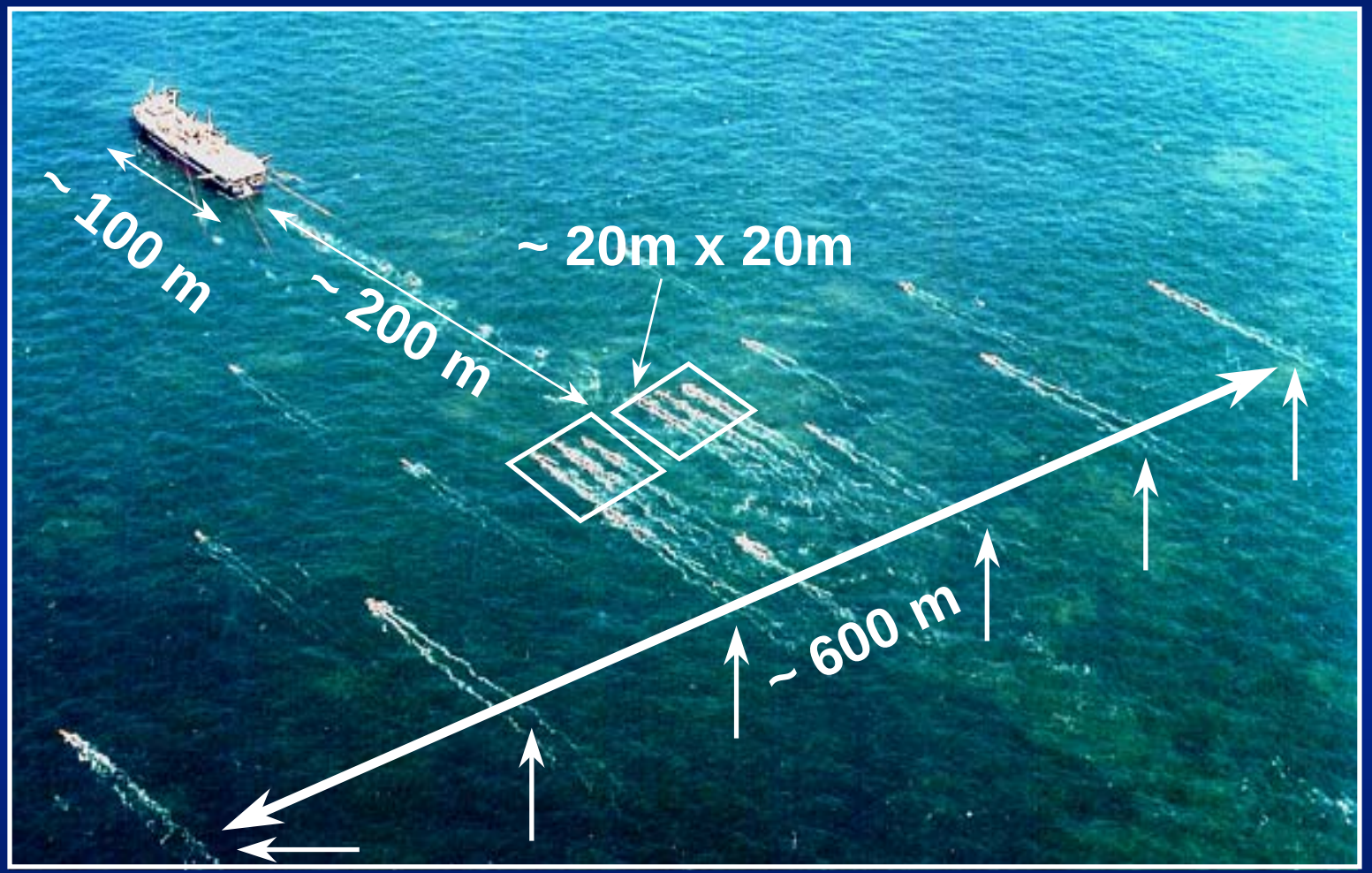
Aerial View of Seismic Vessel in Operation



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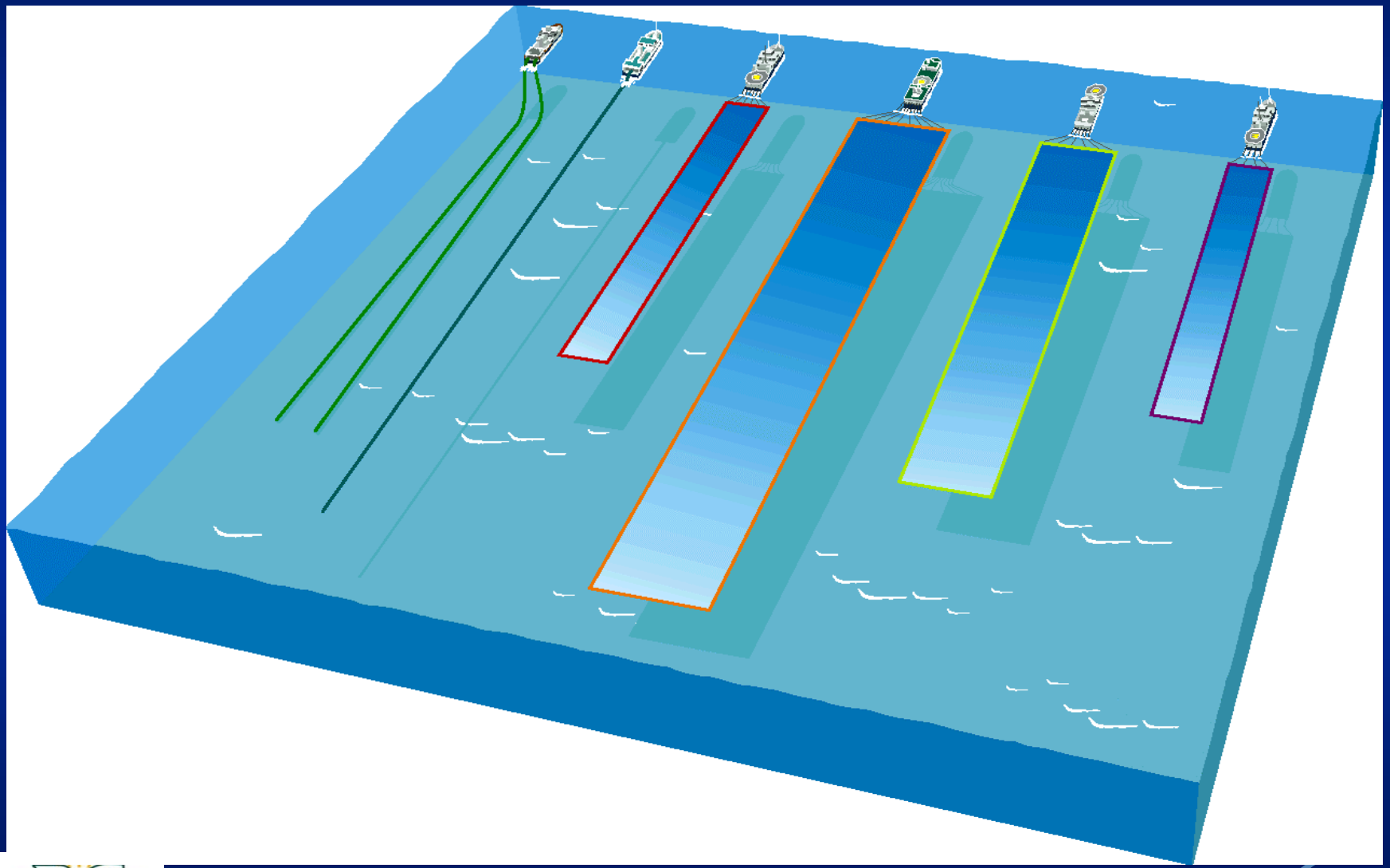
VESSEL “FOOTPRINT” CONCEPT



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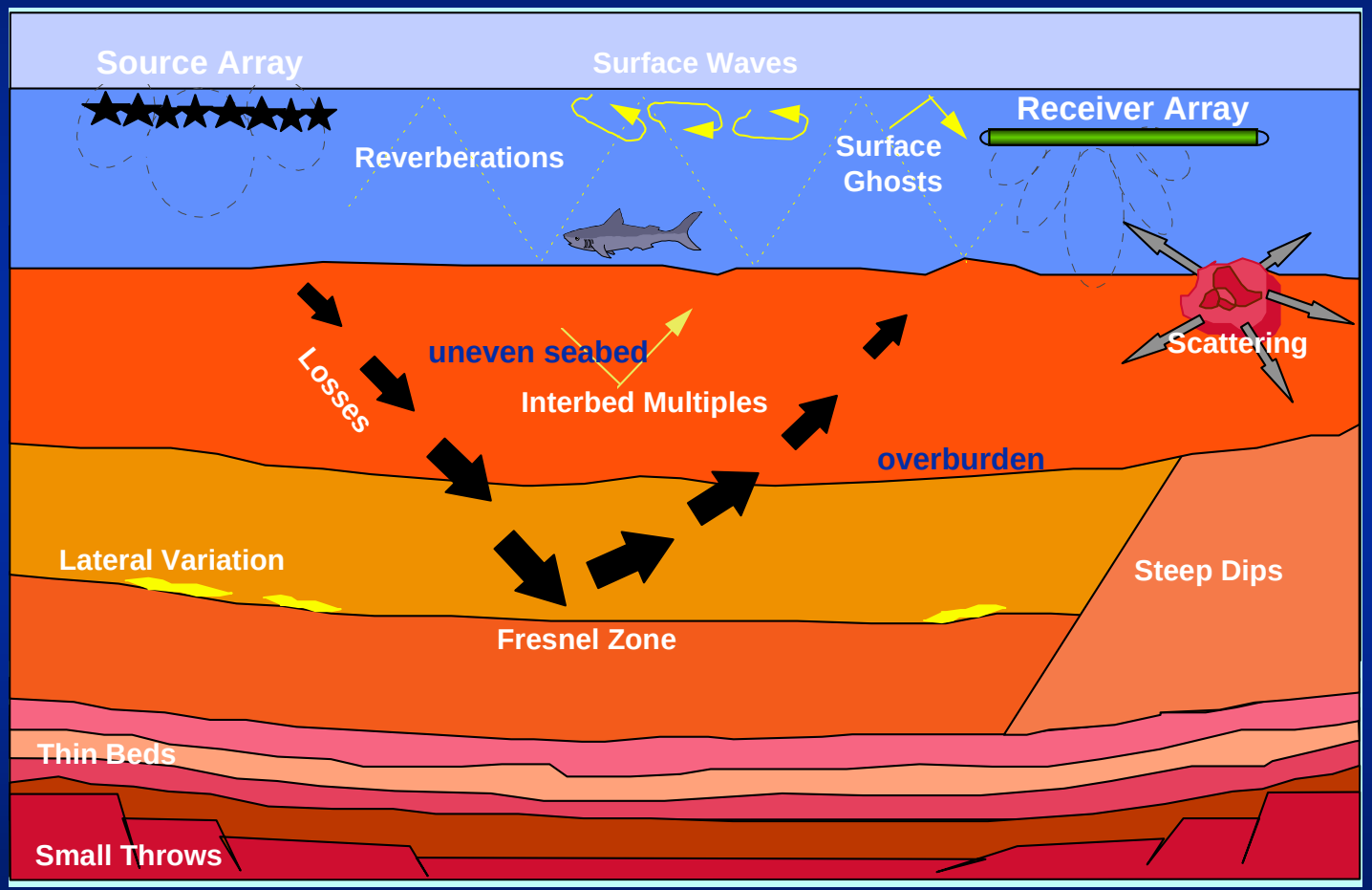
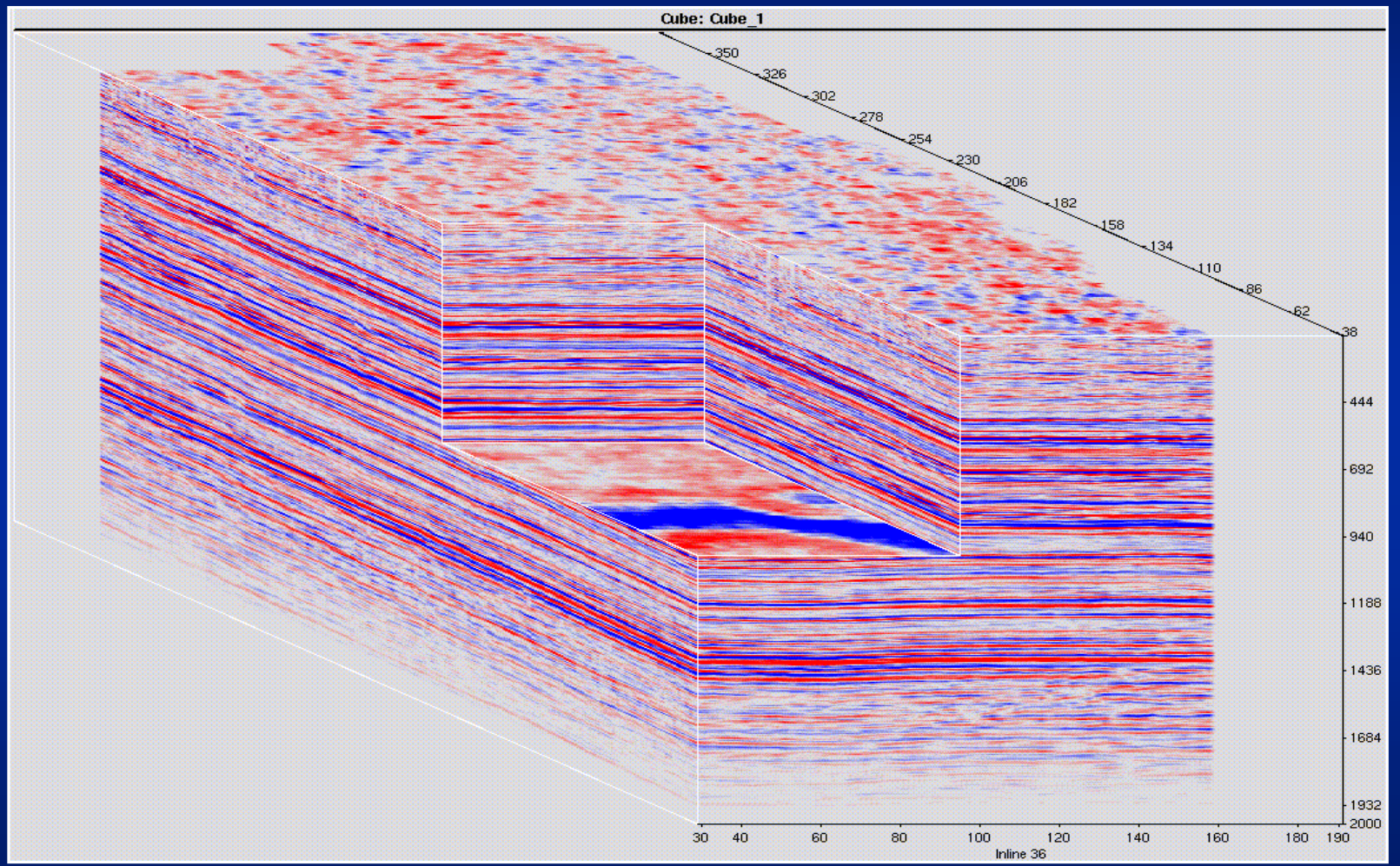
Constituents of Seismic Data



STANDARD SEISMIC DATA
3D PROCESSING



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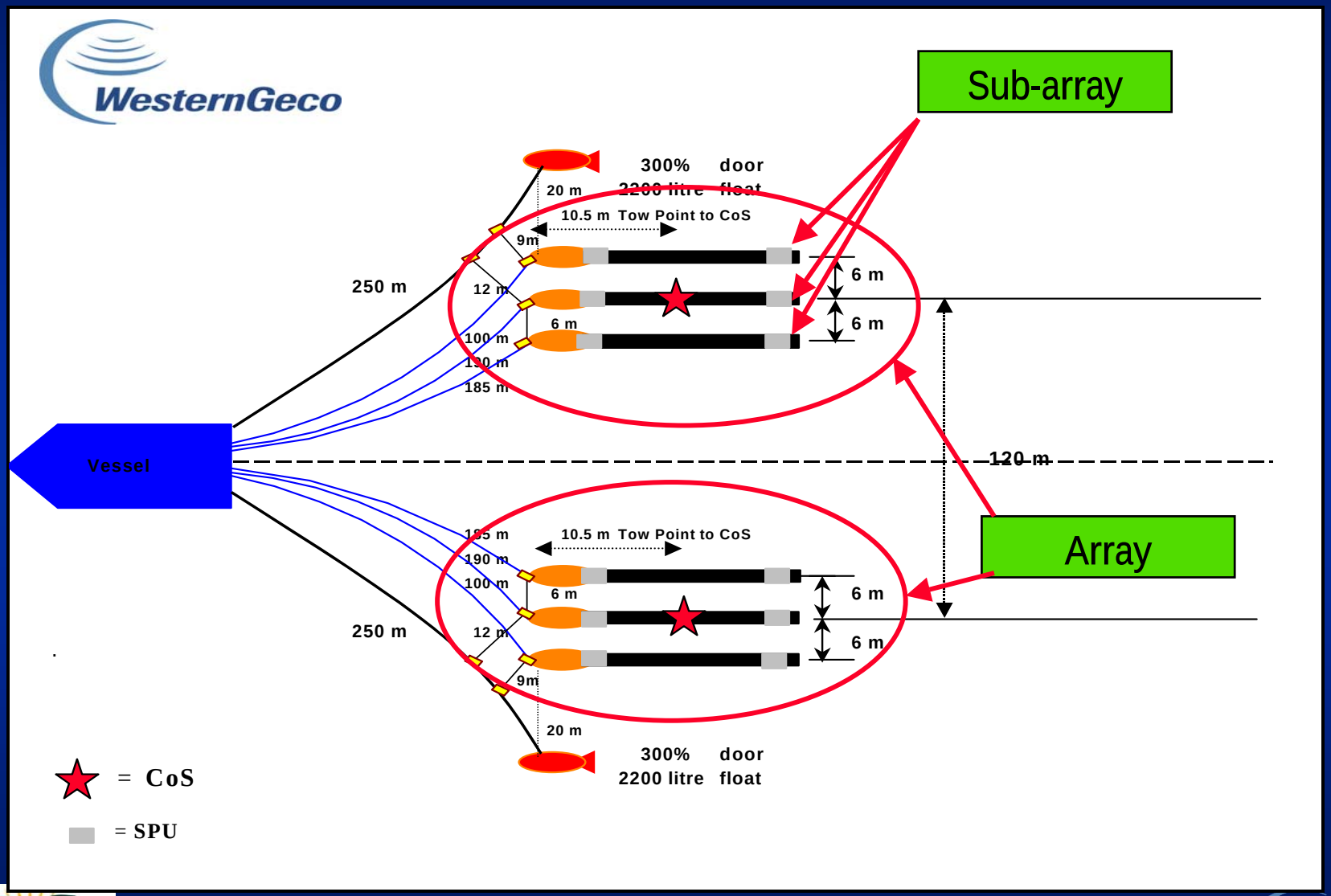
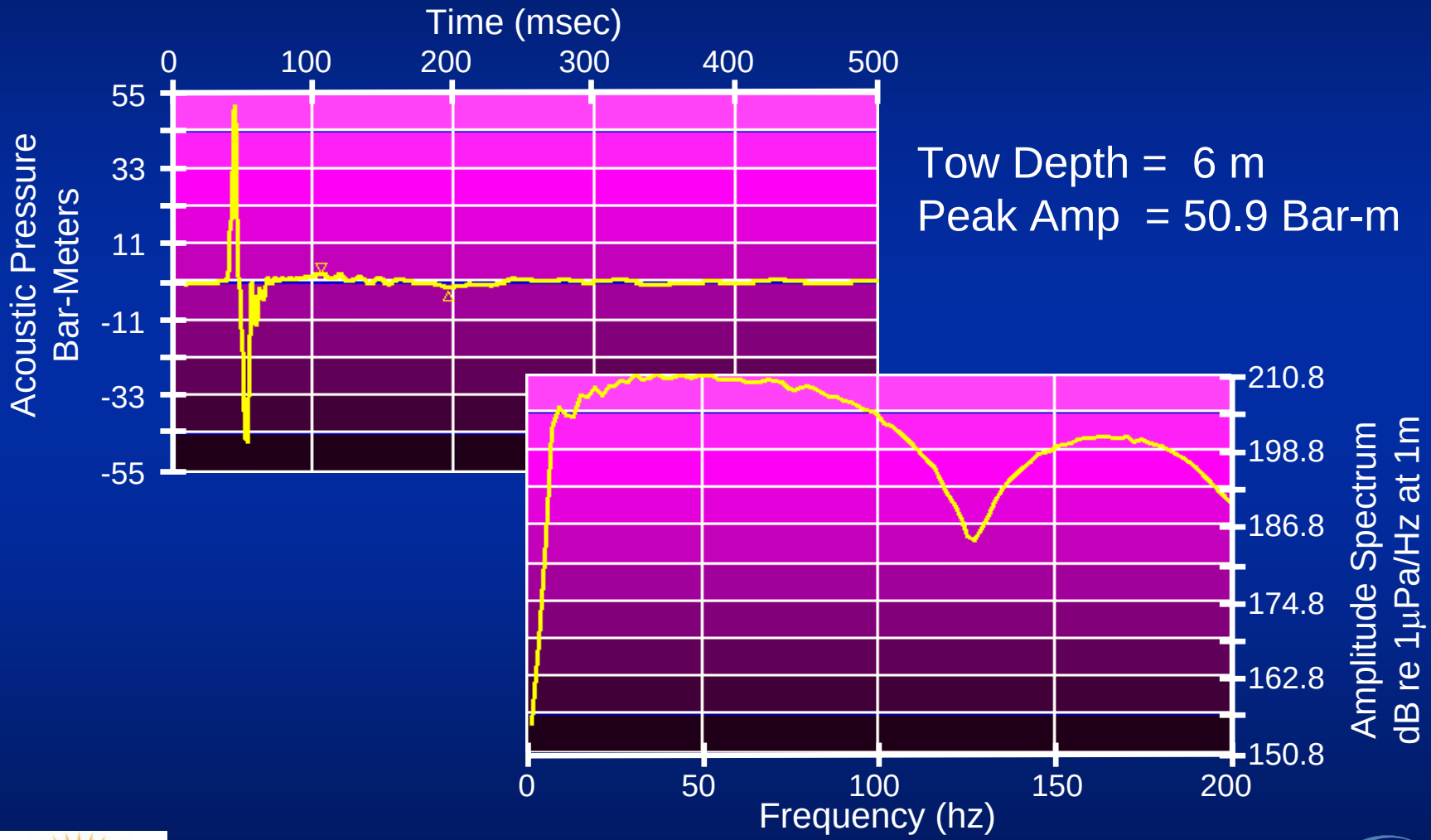
Dual source



3397 Airgun Array Output (6 Meter Tow Depth)



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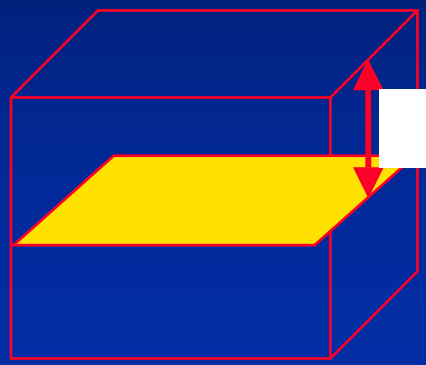
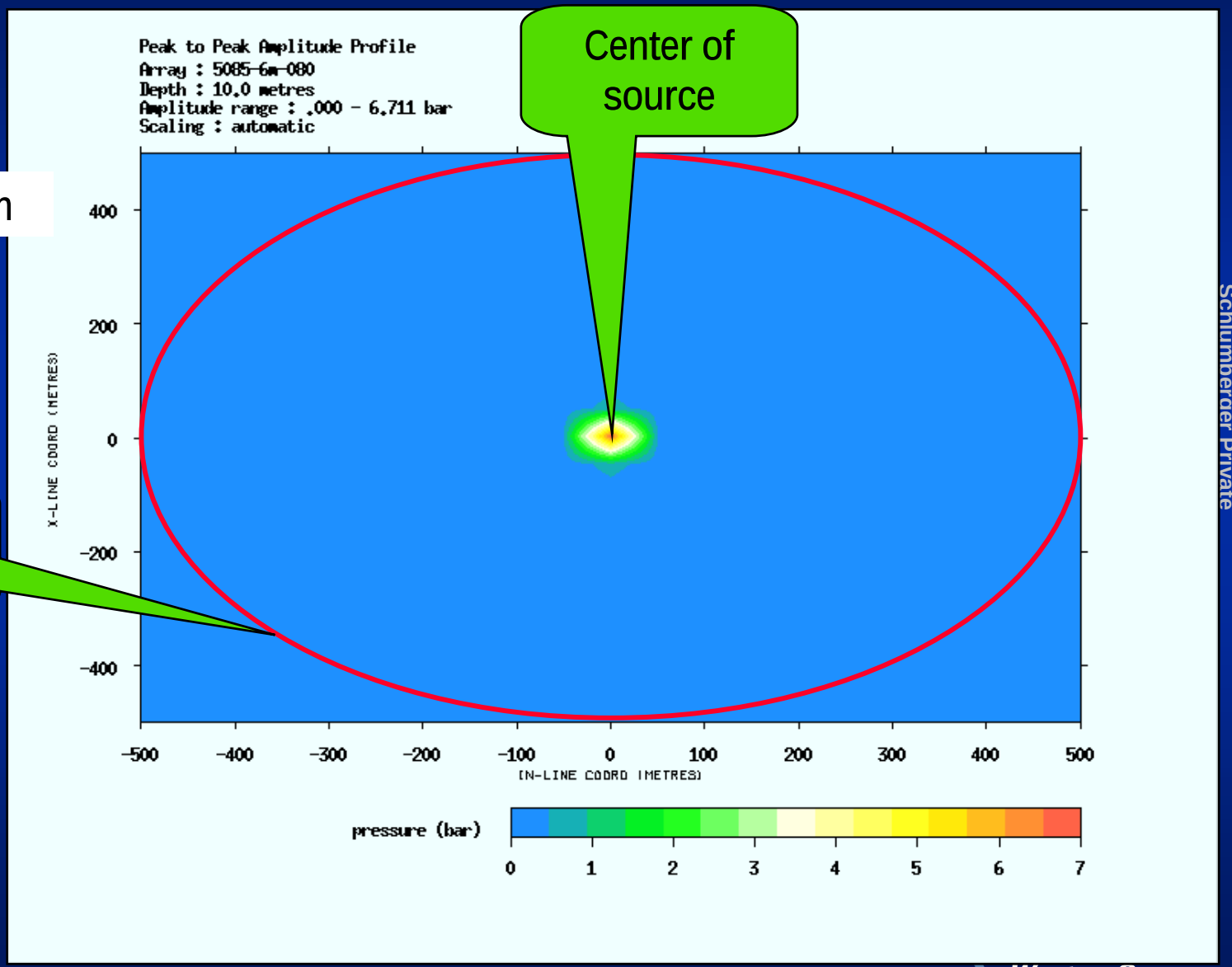
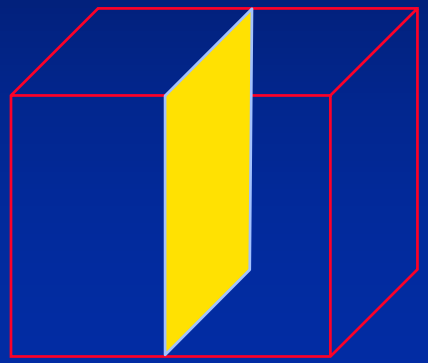
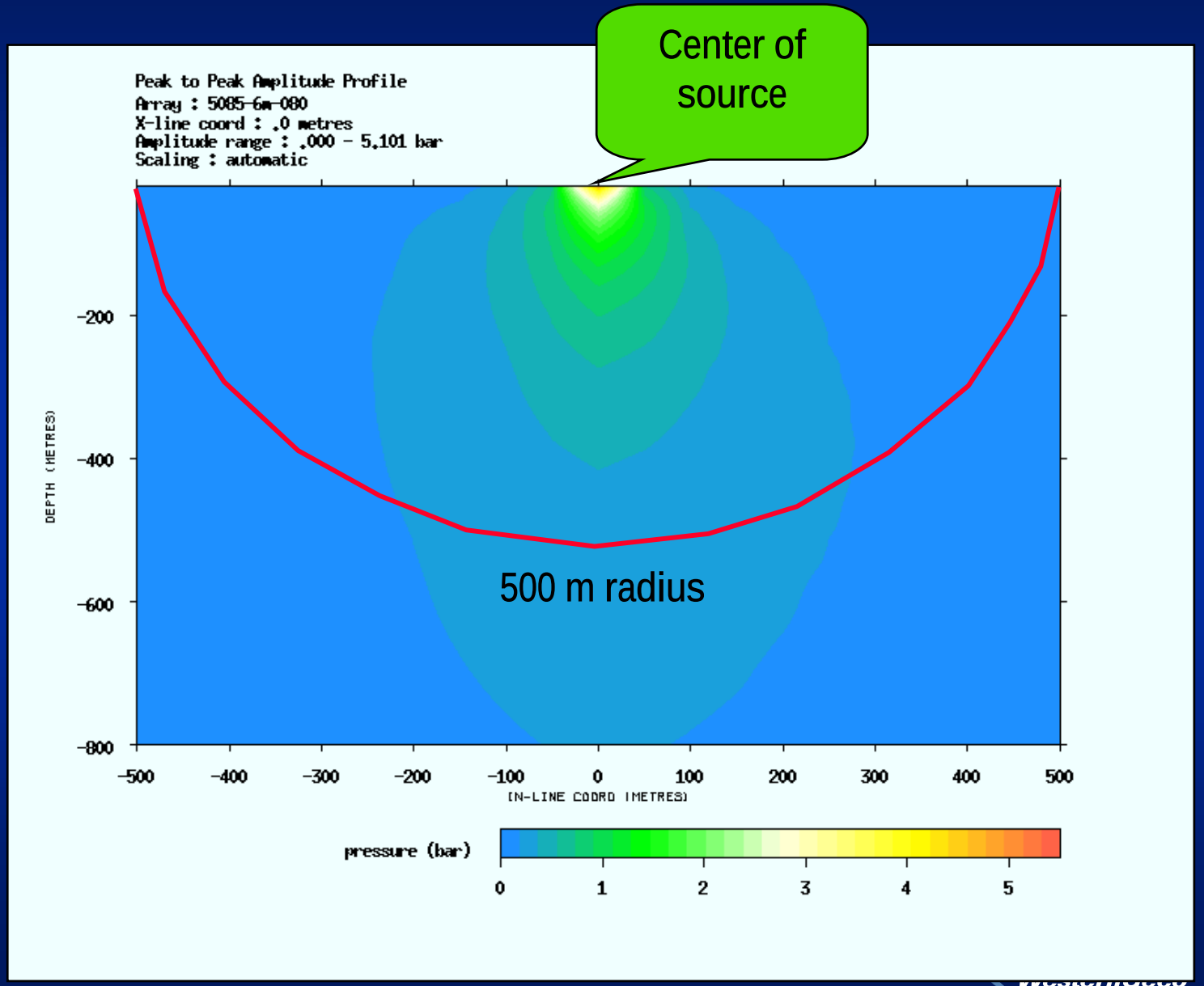
Peak to Peak pressure in the horizontal plane at 10m depth, far field.





Peak to Peak pressure in the vertical plane





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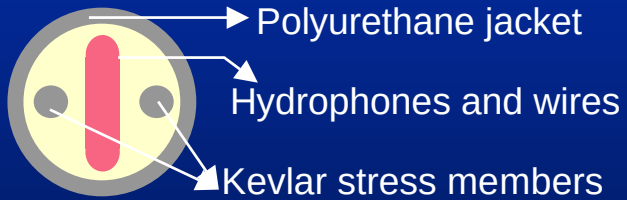
Nessie 4 Streamer

- High vessel efficiency through minimal technical down-time
- High strength for increased streamer lengths
- Contains foam and ISOPAR M

Cross-section cartoon of streamer:



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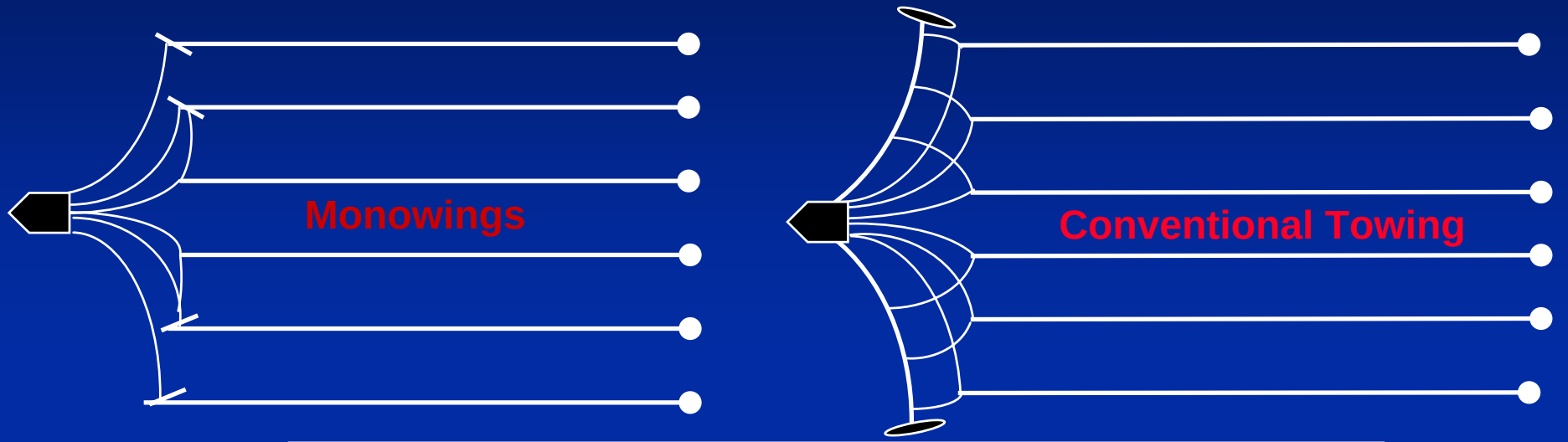
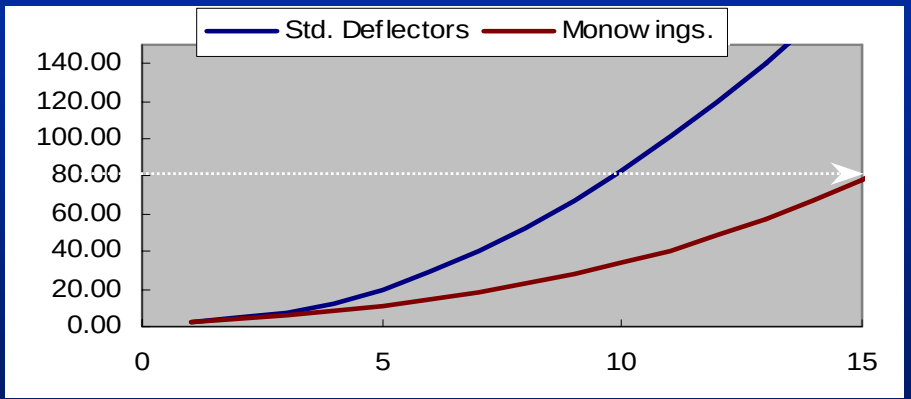
Monowing Towing Technology

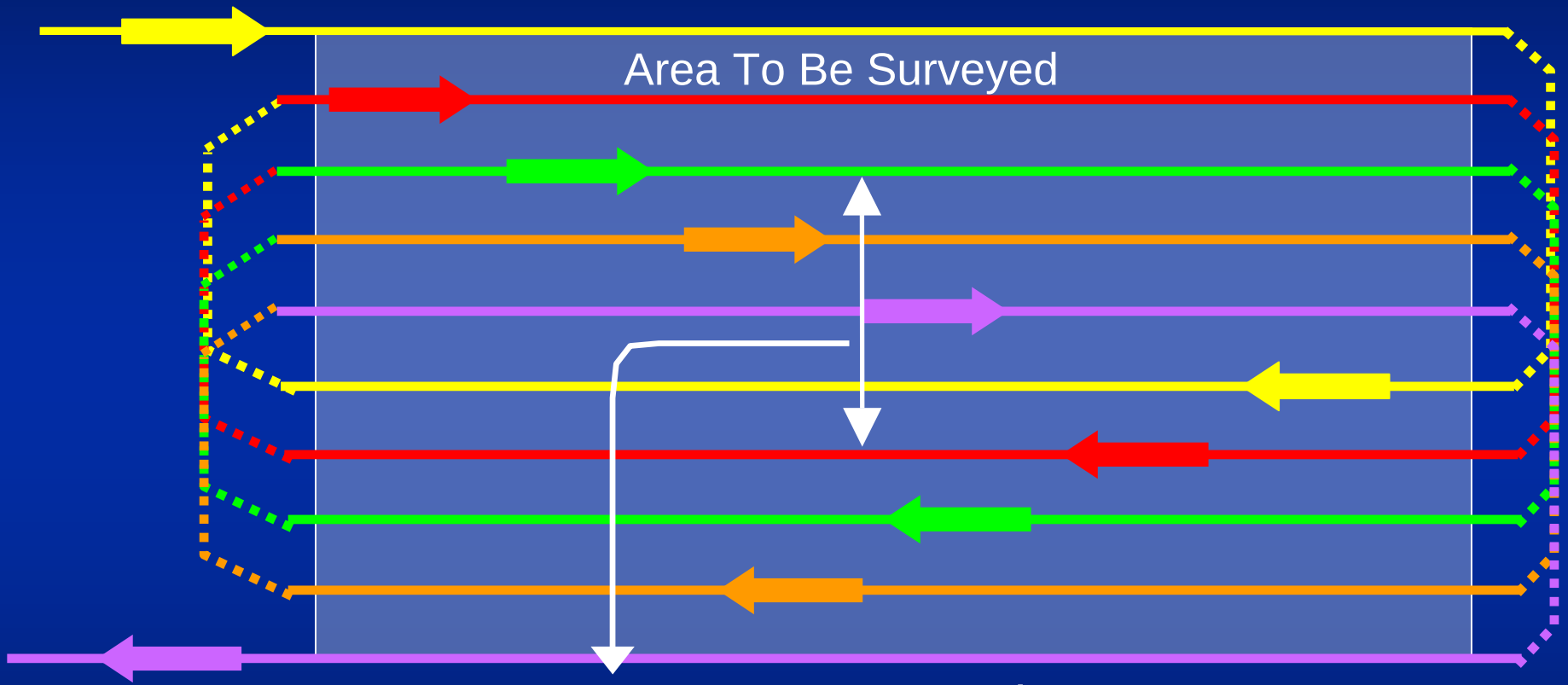


Total Drag (t) for N Streamers (6000 m, Δ y = 100 m)



Typical Pulling Limitation

3D Seismic Surveys:
Shot Zamboni or Race Track Style



At Least As Long As The Streamer:
In The GoM, At Least 6 Km.

Turns Take At Least 2.5 Hours

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Horizontal & vertical streamer steering

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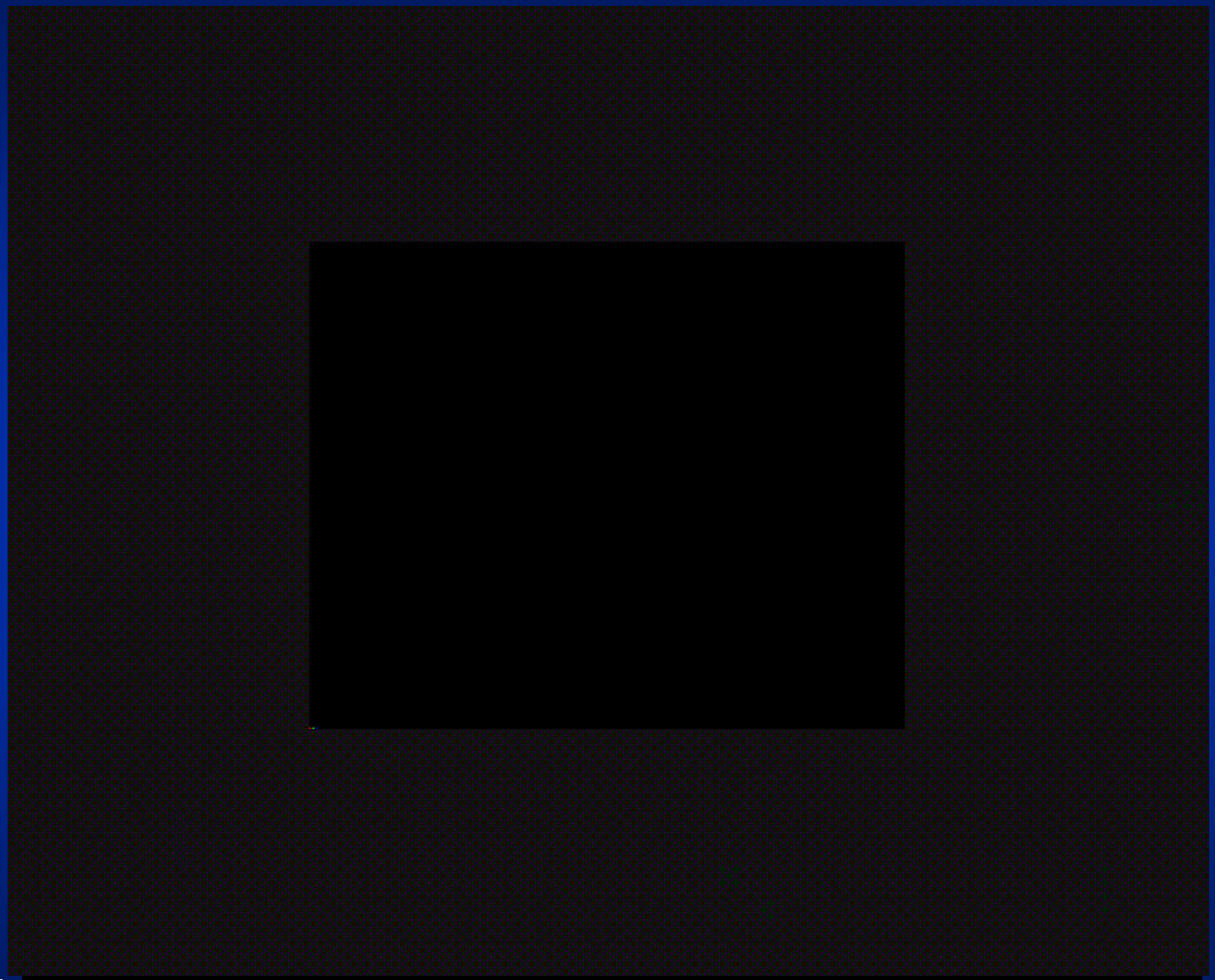
Streamer Steering



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Acoustic Testing from Mackenzie River 2002 Project

- The Objectives

- Record seismic source levels
- Record ambient and back ground noise
- Record sound attenuation over distance

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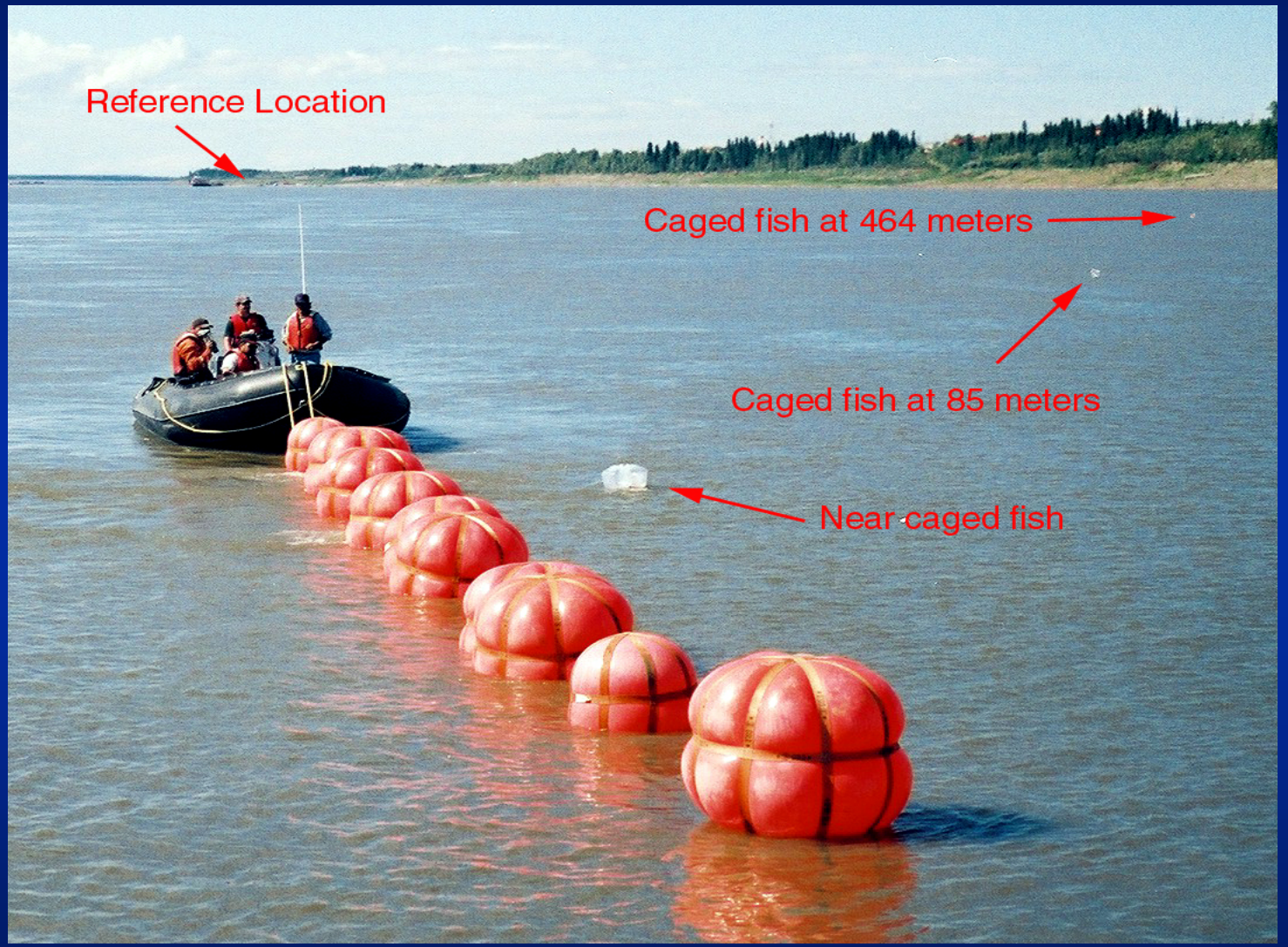
Positioning of the cages



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Caged Fish Assessment Result

- Test located in backwaters at Norman Wells
- Sound level was 220 db at 2 m from airguns
- 4 fish out of 196 died (no large fish mortalities)
- Examinations show that these fish did not die from exposure to airguns, but died as a result of handling induced stress.

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WesternGeco Mitigation Measures

Bottlenose Whales

- Ramped Start-up
- Source Shutdown
- Documentation & Reporting
- Trained Mammal Observers
- Passive Acoustic Monitoring

Questions

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