APPLYING DOUBLE-DIFFERENCE METHODS FOR LONG RANGE TRACKING OF SPERM WHALES (*Physeter macrocephalus*) ON A SMALL APERTURE VERTICAL ARRAY

Ludovic Tenorio-Hallé, Aaron M. Thode, Jit Sarkar, Chris Verlinden, William S. Hodgkiss, William A. Kuperman





BACKGROUND:

• Double-difference method originally developed in seismology to localize earthquakes (Waldhauser & Ellsworth, 2000) and later introduced to underwater acoustics for tracking fin whales using a bottom mounted seismometer network (Wilcock, 2012).

OBJECTIVE:

 Adapt double-difference method to tracking sperm whales on a small aperture vertical hydrophone array in deep water.

128 ELEMENT MF NOISE ARRAY COMM BUOY: - 900 MHZ, 2.4GHZ RADIO MODEMS - IRIDIUM RELAY - GPS - FLASHER, RADAR REFLECTOR - IRIDIUM BEACON - ALKALINE BATTERY PACKS SURFACE FLOAT LIFT LINE (2m) 6m SURFACE LINE CHAIN IN TUBE -70# TOTAL 200# NOTCHED ELLIPSOID FLOAT-UMBILICAL (4TSP) 305m UMBILICAL EXTENSION -210# TOTAL 2 x 200# ELLIPSOID FLOATS ~330m -600# TOTAL BUNDLED ARRAY CABLES ELEMENT 1 - 128 HYDROPHONES @ 0.1 m SPACING (CENTER) - 2 STRENGTH MEMBERS (L,R) - LIFT LOOPS @ 2m SPACING 12.7m APERTURE ELEMENT 128 BOTTOM STRUCTURE ACOUSTIC RELEASE DRAWING NOT TO SCALE

- 128 hydrophones
- 12.7 m aperture (0.1 spacing)
- Deployed at 330 m depth
- 4 km deep waters in flat bathymetry area
- February 2014
- Used to simulate shortaperture localization methods from mobile platforms.



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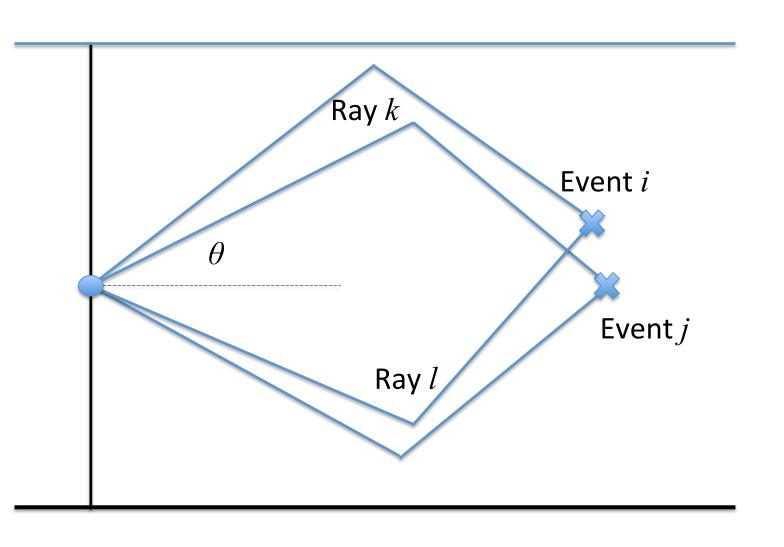
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MOTIVATION:

 Standard ray propagation modeling often yields scattered results due to array tilt and range-dependence/model mismatch of the acoustic environment (sound speed, bathymetry). The double-difference method may be more robust and compensate for these features.



Thank you, and come see my poster tomorrow!