Data needs and motivation
Eliza Michalopoulou
Department of Mathematical Sciences
New Jersey Institute of Technology
Data Needs

- Wide range of frequencies: 10 Hz to 4 kHz. (Combustive source with power in low frequencies? Chirps, time domain signals are important.)
- Tracks (continuous measurements).
- Benign area.
- Ground truth.
Dispersion Analysis - Time-Frequency

Which modes are identified?
Dispersion Analysis
Dispersion - Uncertainty

Modal frequency PDFs for two modes

Sediment sound speed – first layer
True value: 1674 m/s
Shallow Water-06

Schwartz-Rissanen criterion
(Time delay estimation
Michalopoulou and Picarelli JASA 2006)

Dispersion (combustive source)
Arrival time inversion

(a) 

(b) 

(c) 

(d)
Inversion for Sound Speed using arrival times – SW06

Blue: mean ssp
Black: MAP ssp
Cyan: particles

EOF PDF relatively flat (short range)
Sequential filtering (successful in inversion)

- Successful inversion, arrival time estimation, and model order estimation with PFs in ocean acoustics.

Zorych, Michalopoulou, JASA-EL, 2008
Yardim, Gerstoft, Hodgkiss, JASA 2009
Yardim, Michalopoulou, Gerstoft, JOE 2011
Jain, Michalopoulou, JASA-EL, 2011