High frequency source localization in the Strait of Sicily

C. Soares csoares@ualg.pt
SiPLAB - FCT, Universidade do Algarve, Faro, Portugal
M. Siderius thomas.m.siderius@saic.com
SAIC, Ocean Sciences Div., San Diego, USA
S.M. Jesus sjesus@ualg.pt
SiPLAB-FCT, Universidade do Algarve, Faro, Portugal

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Abstract : The ADVENT'99 sea trial took place in the area of the Adventure Bank in the Strait of Sicily during May 1999, with the objective of testing matched-field processing (MFP) techniques. A 62 m aperture - 31 hydrophone vertical line array was deployed at 2, 5 and 10 km from an acoustic source. The source was emitting a series of multi-tone signals alternating with LFM sweeps in two frequency bands: 200-700 Hz and 800-1600 Hz. One of the most stringent impairments in MFP is the impact of missing or erroneous environmental information on the final source location estimate. This problem is known in the literature as model mismatch and is strongly frequency dependent. A number of MFP processors have been proposed to cope with inevitable model mismatch in real data. The approach taken in this paper includes a incoherent broadband conventional Bartlett processor used in a two step procedure: in the first step the data is pre-focused using genetic search where the environmental and geometric parameters are estimated and in the second step an exhaustive search is performed for source range and depth. This method showed to be effective up to 10 km range in the higher frequency band achieving a precise localization *during the whole recording of the 5 km track, and most of the 10 km track*. It is shown that the increasing MFP dependence on erroneous environmental information at high frequency and at longer ranges can only be accounted for by including a time dependent modelling of the water column sound speed profile.

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