



## Abstract View

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# Tomographic Maps of the Ocean Mesoscale. Part 1: Pure Acoustics

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### ABSTRACT

A field test of ocean acoustic tomography was conducted in 1981 for a two month period in a 300 km square at 26°N, 70°W in the North Atlantic (just south of the MODE region). Nine acoustic deep-sea moorings with sea floor transponders for automated position keeping and with provisions for precise time keeping were set and recovered. From the measured travel times between moorings, various displays of the three-dimensional field of sound speed

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(closely related to temperature) have been obtained by inversion procedures. These procedures use historical ocean data as a reference, but all information from the *in situ* surveys has been withheld; the “pure” tomographic results were then compared to direct *in situ* observations. The tomographically derived spatial mean profile compares favorably to an equivalent profile from the *in situ* observations; both differ significantly from the historical average. Maps constructed at three day intervals for a two month period show a *pattern* of eddy structure in agreement with the direct observations within computed mapping errors, but these mapping errors are too large for many oceanographic purposes. The mapping errors are the result of an unexpectedly large noise variance in travel time. (A 1983 experiment, using sources with larger bandwidth, reduced this variance to acceptable limits.) The 1981 tomographic results strongly suggest that the ocean sometimes undergoes transitions too rapid to be mapped over such large areas by shipboard observations.

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