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**Quantifying the uncertainty of geoacoustic parameter estimates in
a dynamic environment using oceanographic data**

Ross Chapman and Yong-Min Jiang
University of Victoria, 3800 Finnerty Rd, Victoria, BC, Canada V8W 3P6

This paper presents results of Bayesian matched field geoacoustic inversion in a temporally and spatially varying shallow water environment. The acoustic data were collected by a vertical line array at ranges of 1, 3 and 5 km in the SW06 (Shallow Water 06) experiment carried out in August 2006. The sound speed profiles measured at the array and at the source positions during the experiment showed significant variation in the thermocline in the middle part of the water column. The resulting uncertainty in the sound speed profile in the water impacts the performance of matched field inversion methods in estimation of geoacoustic model parameters. In previous work, an effective sound speed profile was estimated in the inversion, based on empirical orthogonal functions (EOFs) derived from a limited number of sound speed profiles measured at the time of the experiment. This paper explores the effect of using a larger number of profiles measured over several days in the SW06 experiment to include a greater diversity of ocean conditions in generating the EOFs. The inversion results for the two approaches are compared in terms of marginal probability distributions of the estimated geoacoustic parameters. (Work supported by Office of Naval Research).