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Validation of adjoint-generated environmental gradients for the acoustic monitoring of a shallow water area

Matthias Meyer^{a,b}, Jean-Pierre Hermand^{b,a}, Mohamed Berrada^c and Mark Asch^d

^aRoyal Netherlands Naval College (NLDA) - REA group, PO Box 10000, 1780 Den Helder, Netherlands

^bUniversité libre de Bruxelles (U.L.B.) - Environmental hydroacoustics lab, av. Franklin D. Roosevelt 50, CP 194/5, 1050 Bruxelles, Belgium

^cLaboratoire d'Océanographie et du Climat - Expérimentation et Approches Numériques, Université Pierre et Marie Curie, Tour 45-55 - 5ème étage - 4, place Jussieu, 75005 Paris, France

^dUniversité de Picardie Jules Verne, LAMFA (CNRS UMR 6140), 33 Rue Saint Leu, 80039 Amiens, France

In the framework of the recent Maritime Rapid Environmental Assessment sea trial MREA07/BP'07 [Le Gac&Hermand, 2007] that was conducted in the same area south of the island of Elba as the earlier Yellow Shark trial (YS94), this paper examines the original YS94 acoustic data and the recent MREA07 oceanographic data to demonstrate adjoint-based acoustic monitoring of environmental parameters in Mediterranean shallow waters. First, adjoint-generated environmental gradients are validated for the application in geoaoustic inversion where the bottom acoustic parameters of the YS94 layered seabed are determined from the long-range waterborne propagation of a multi-frequency signal. Then, for the application in ocean acoustic tomography, the temporal variability of the MREA07/BP'07 oceanographic data is analyzed in terms of empirical orthogonal functions and the adjoint-based inversion scheme is used to track the time-varying sound speed profile of the experimental transect.