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A new 2D, finite differences wave propagation algorithm for seismic oceanography: comparison between modelled and measured shot gathers

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In a pioneer work published in Science in 2003 Holbrook *et al.* showed that multichannel seismics (MCS) provides detailed information on the oceans' finestructure, launching seismic oceanography as a new scientific discipline. MCS can give information on the water column structure as well as hints on the oceanographic properties of the different water layers by processing the wavefield reflected on the acoustic interfaces. Several studies have reported reflections from the fine structure developed at the boundary zone between contrasting water masses to be as weak as -80 dB. As part of the Spanish (CSIC) funded Geocean project, we analyse here if high order numerical algorithms are suitable to accurately model the extremely weak wavefield scattered by the ocean finestructures. For this purpose, we compare real shot gathers acquired during the SWIM-2006 seismic experiment with synthetic ones obtained using a new, 2D, finite differences seismic wave propagation algorithm including PML absorbing boundary conditions specifically developed for seismic oceanography. The comparison made includes both direct -time domain- comparison and time/frequency analysis.