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Please fill in your abstract title.	Reconstruction of S-Waves from Low-Cost Randomised and Simultaneous Acquisition by Joint Sparse Inversion

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Abstract

Objectives/Scope:
Due to the lower shear waves velocity compared with compressional waves, finer spatial sampling is required to properly record the earlier, which increases the acquisition costs. To utilize multicomponent data to its available full extent, to avoid having the Nyquist criterion as the deciding cost factor, and to efficiently acquire the data, which subsequently decrease the acquisition costs, we propose acquiring blended and randomly under-sampled ocean bottom seismic data followed by joint multi-component reconstruction with sparsity promotion.

Methods, Procedures, Process:
We utilized ideas from the field of compressive sensing to reconstruct densely sampled up- and down-going shear waves from blended and randomly subsampled data. With such sampling, aliasing is turned into incoherent noise in a transform domain which enables us to formulate the reconstruction problem as a denoising problem. Instead of multi-step processing, we solve one sparsity promotion optimization problem where the inputs are the blended or subsampled multi-component data and the outputs are the up- and down-going wavefields.

Results, Observations, Conclusions:
Since we use all the blended or subsampled multicomponent data in one optimization problem, we benefit from not having to solve and tune multiple optimization problems for different components. When reconstructing single components separately, the outcome may not honor the relative amplitude values between the components. Therefore, amplitudes of each component as well as the noise levels have to be studied carefully before and after reconstruction. While in the joint formulation case, the information from each component is weighted by multiplication with appropriate factors, which ensures having correct up- and down-going wavefields. Additional benefits of our proposed method include computational efficiency.

Novel/Additive Information:
Compared with current practice, our proposed scheme enables the potential for utilizing the S-waves at a lower cost by acquiring compressively sampled multi-component data and then reconstructing up- and down-going wavefields through solving one optimization problem with computational efficiency.