Sensor Selection for Seismic Wavefield Reconstruction based on Sparse Observation (Part I. Proposal and Evaluation on Method based on Linearized Model of Governing Equation)

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In the present study, we propose a sparse sensor selection method for the accurate reconstruction of the seismic wavefield. The sensor candidate matrix, which presents the sensitivity of each sensor candidate to the wavefield, is constructed using simulations of the seismic wavefield with the horizontally layered subsurface structure model. Then, the sparse sensor positions are determined by the greedy method based on D-optimality for the optimal experimental design. Finally, the parameters related to the source and local subsurface structure are estimated using the selected sensors, and the proposed method is evaluated by comparing to the results using random sensor selection.

Keywords: Sparse sensor optimization, Low-dimensional model, model-based approach