

# Proposal of Selection Method of Observation Sites for Physical Model Parameter Estimation toward Process-Driven Seismic Wavefield Reconstruction

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In the present study, we propose an observation site selection method for the accurate reconstruction of the seismic wavefield by process-driven approaches.

The proposed method selects observation sites suitable for accurately estimating physical model parameters to be input into a numerical simulation of the seismic wavefield. The seismic wavefield is reconstructed by the numerical simulation using the parameters estimated by the proposed method. The matrix corresponding to the sensitivity of each observation site candidate to the parameters is constructed using simulations, and then, observation sites are selected by evaluating the value of the sensitivity matrix based on the D-optimality proposed in the optimal experimental design.

In the present study, physical knowledge on the sensitivity to the parameters such as seismic velocity, layer thickness, and hypocenter location was obtained by investigating the characteristics of the sensitivity matrix. Furthermore, the effectiveness of the proposed method was shown by verifying the accuracy of seismic wavefield reconstruction using the observation sites selected by the proposed method.

Keywords: Seismic wavefield reconstruction, Process-driven approach, Sparse sensor optimization, Parameter sensitivity