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An evaluation to trace phase of surface wave using the seismic interferometry

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Using seismic interferometry, group velocities between 2 sites have been successfully evaluated from microtremor long term records by previous researches. If seismic interferometry can reproduce Green's function, we can estimate not only group velocities but also phase traces. In this study, we propose a method to evaluate propagation of surface waves, confirm the validity through the numerical test, and show application to the observed data.

We calculate deconvolution waveform against cross correlation at the end of the target area, in order to trace the propagation of surface waves on the target area. In numerical test, the waves from the surrounding sources were calculated using the reciprocity theory to represent the equipartition wave field. We set subsurface structure the 2 layer models, which are stratified model, 2 dimensional irregular model and 3-dimensional irregular model. The Green's function, which was regarded as a correct result, was calculated by the point force with FDM, and we confirmed the validity of the result of seismic interferometry.

The result of seismic interferometry of the stratified model corresponds to the result of Green's function. With the 2 dimensional and 3 dimensional irregular models, the result of the seismic interferometry successfully reproduced the Green's function only for the propagation from the rock area to the sedimentary area, and it is necessary to pay an attention about the direction in calculation of deconvolution and seismic interferometry.

We apply this method to Hi-net stations whose codes are N.ICWH and N.ICEH. The results using 2 reference sites are consistent each other and correspond to the results using 3 dimensional subsurface model.

For future works, we will apply this method near the edge of the Kanto basin to trace the generation of the surface wave induced by basin edge.

Keywords: seismic interferometry, deconvolution