Surface-wave retrieval from ambient-noise observations

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The crosscorrelation of ambient-noise observations of two different seismic receivers is known to yield an approximation of the Green's function as if one of the receivers were a (virtual) source. We apply this principle to field observations collected at two seismic arrays in southwestern USA and use especially responses from noise sources lying at the North Pacific Ocean. Our results contain clear evidence that surface waves can successfully be retrieved from these observations in both the single-frequency and double-frequency microseism bands. This is promising for the potential use of these low-frequency surface waves for the estimation of near-surface properties (e.g., shear-wave velocity profile).

In many applications the noise sources employed in surface-wave retrieval are not regularly distributed, which affects the quality of the result. This lack of equipartitioning is expressed by the so-called point-spread function that can be computed from the ambient-noise field. We show this point-spread function to quantify the spatial and temporal smearing of the virtual source, as well as preliminary results of multidimensional deconvolution of the crosscorrelation result by this function. The latter process is known to partially correct for the lack of equipartitioning and might thus increase the accuracy of the retrieved surface waves.