Towards Structural Imaging Using Scattering Artifacts Detected in Ambient Field Correlations

Lise Retailleau, Gregory Beroza

Correlations of the ambient seismic field have been used successfully for tomographic imaging of the Earth on a wide range of scales. This is based on the theoretical and experimental observations that correlation functions computed between the signals recorded by two stations contain an approximation of the impulse response (Green's function) between these stations. The waves that comprise the ambient field are subject to scattering due to the heterogeneous earth. It is possible to use effects of scattering that do not correspond to the propagation between the two stations considered, to locate potential external sources of signal. For this analysis, we identify supplementary arrivals using array analysis to localize the source of scattering effects linked to strong structural variations. We are particularly interested in imaging scatters that result in coupling between the P-SV and SH systems because they are a consequence of lateral heterogeneities in Earth structure. For that reason, we are interested in components of the correlation tensor, different from the Vertical-Vertical component, and we expect the Radial/Vertical to Transverse components to be particularly helpful.