Geophysical Research Abstracts
Vol. 21, EGU2019-17030-1, 2019
EGU General Assembly 2019


# Performance of 2D numerical sensitivity kernels in monitoring changes in heterogeneous acoustic and elastic media.

Alejandro Duran (1), Anne Obermann (1), Thomas Planès (2), and Roel Snieder (3)

(1) SED, ETH Zurich, Switzerland, (2) Department of Earth Sciences, University of Geneva, Switzerland, (3) Center of wave phenomena, Colorado School of Mines, USA

Probabilistic sensitivity kernels based on the solution of the diffusion and radiative transfer equations have been used to locate tiny changes detected in late arriving coda waves (Obermann et al., 2013; Planès et al. 2014).
While these analytical kernels accurately describe the sensitivity of coda-waves in isotropically scattering acoustic media, in elastic media there is no analytical solution which describes the propagation of wave energy and takes mode conversions into account. Obermann et al. 2013, 2016 proposed to tackle the problem by combining the sensitivities of body and surface waves. Here, we follow up on the idea of Kanu and Snieder 2015 to derive sensitivity kernels using numerical simulations of wave propagation in heterogeneous media. Contrary to the analytical kernels, these numerical kernels can accurately describe the coda-wave sensitivity distribution for any type of medium complexity and propagation regime.

In the present work, we build numerical sensitivity kernels in the acoustic and elastic regimes. We then introduce localized medium perturbations and evaluate the detection capacities of the kernels comparing them with analytical kernel predictions and actual measurements.