S023-07
Coda wave sensitivity kernels for fault zone settings: an application to the North Anatolian Fault Zone

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Abstract:
The effect of scattering on the amplitude of seismic waves is one of the most poorly understood physical processes controlling seismic energy attenuation in the Earth's lithosphere. As a consequence, most studies have assumed homogeneous distribution of scattering properties for imaging and monitoring the crust, while it is well-known that in certain settings, such as fault zones, the scatterers are inhomogeneously distributed. In this study we investigate the implications of heterogeneous scattering on the sensitivity kernels used for monitoring temporal velocity changes in the crust.

We use a model with laterally varying scattering properties of the North Anatolian Fault Zone (NAFZ), which we derived from ambient noise cross-correlations of the Dense Array of Northern Anatolia [DANA, 2012]. The scattering model has a narrow fault zone (~5.5km) of high scattering along the northern strand of NAFZ, with a scattering mean free path in the order of 10 km, surrounded by neighbouring regions that have a much larger scattering mean free path (>100km).

To assess the effect of the heterogeneous scattering distribution for the sensitivity kernels of coda waves, numerical simulations based on radiative transport theory are presented here. We evaluate separate travel-time and decorrelation sensitivity kernels for perturbations in scattering strength, scattering anisotropy and wavespeed perturbations for different source-receiver configurations in the fault zone setting of NAFZ.

References:

DANA: Dense array for Northern Anatolia, 2012, International Federation of Digital Seismograph Networks doi:10.7914/SN/YH2012.