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Monitoring of temporal seismic velocity changes in the North Anatolian Fault zone using data derived scattering properties

Chantal van Dinther[1], Michel Campillo[1], Ludovic Margerin[2], and Albanne Lecointre[1]
[1]Université Grenoble Alpes, Institut des Sciences de la Terre, Grenoble, France (chantal.van-dinther@univ-grenoble-alpes.fr)
[2]IRAP-CNRS, Université Paul Sabatier Toulouse 3

Monitoring of temporal seismic velocity changes can provide us with information on the mechanical state of the Earth's crust due to processes of stress build-up and release.

In current work, we use the Dense Array of North Anatolia [1], which has been continuously recording from May 2012 until October 2013, to analyse the spatio-temporal variations of seismic velocity changes in the North Anatolian Fault zone (NAF). We compute daily ambient-noise cross-correlation functions for all 63 three-component stations in the frequency band between 0.1 – 1 Hz.

To retrieve spatial distribution of seismic velocity changes in such an inhomogeneous fault zone, we go beyond the simple linear travel-time shifts approximation and homogeneous sensitivity kernel. We therefore invert for the travel-time shifts at different lag-times. Furthermore, we use sensitivity kernels for media with inhomogeneous scattering properties. The scattering properties for the sensitivity kernels are derived from the data: a scattering mean free path inside the fault zone (northern strand of NAF) of 10 km and 150 km outside the fault zone, the attenuation coefficient inside and outside the fault zone are 80 and 100 respectively.

[1] DANA. Dense array for north anatolia. International Federation of Digital Seismograph Networks doi:10.7914/SN/YH2012, 2012.