A Green's function database platform for seismological research and education: applications and examples

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The study of seismic sources from measured waveforms requires synthetic elementary seismograms (Green's functions, GF) calculated for specific earth models and source receiver geometries.

Since the calculation of GFs is computationally expensive and requires careful parameter testing and quality control, pre-calculated GF databases, which can be re-used for different types of applications, can be of advantage.

We developed a GF database web platform for the seismological community (http://kinherd.org/), where a researcher can share Green's function stores and retrieve synthetic seismograms on the fly for various point and extended earthquake source models for many different earth models at local, regional and global scale.

This web service is part of a rich new toolset for the creation and handling of Green's functions and synthetic seismograms (http://emolch.github.com/pyrocko/gf). It can be used off-line or in client mode.

We demonstrate core features of the GF platform with different applications on global, regional and local scales. These include the automatic inversion of kinematic source parameter from teleseismic body waves, the improved depth estimate of shallow induced earthquakes from regional seismological arrays, or the relative moment tensor inversion of local earthquakes from volcanic induced seismicity.