The Seismic Tool-Kit (STK): an open source software for seismology and signal processing.

Dominique Reymond

CEA/DASE/LDG, Papeete, Tahiti, French Polynesia (reymond.d@labogeo.pf)

We present an open source software project (GNU public license), named STK: Seismic ToolKit, that is dedicated mainly for seismology and signal processing. The STK project that started in 2007, is hosted by SourceForge.net, and count more than 19 500 downloads at the date of writing.

The STK project is composed of two main branches:

First, a graphical interface dedicated to signal processing (in the SAC format (SAC_ASCII and SAC_BIN): where the signal can be plotted, zoomed, filtered, integrated, derivated, ... etc. (a large variety of IFR and FIR filter is proposed). The estimation of spectral density of the signal are performed via the Fourier transform, with visualization of the Power Spectral Density (PSD) in linear or log scale, and also the evolutive time-frequency representation (or sonagram). The 3-components signals can be also processed for estimating their polarization properties, either for a given window, or either for evolutive windows along the time. This polarization analysis is useful for extracting the polarized noises, differentiating P waves, Rayleigh waves, Love waves, ... etc.

Secondly, a panel of Utilities-Program are proposed for working in a terminal mode, with basic programs for computing azimuth and distance in spherical geometry, inter/auto-correlation, spectral density, time-frequency for an entire directory of signals, focal planes, and main components axis, radiation pattern of P waves, Polarization analysis of different waves (including noize), under/over-sampling the signals, cubic-spline smoothing, and linear/non linear regression analysis of data set. A MINimum library of Linear AlGebra (MIN-LINAG) is also provided for computing the main matrix process like: QR/QL decomposition, Cholesky solve of linear system, finding eigen value/eigen vectors, QR-solve/Eigen-solve of linear equations systems ... etc.

STK is developed in C/C++, mainly under Linux OS, and it has been also partially implemented under MS-Windows.

Usefull links:
http://sourceforge.net/projects/seismic-toolkit/
http://sourceforge.net/p/seismic-toolkit/wiki/browse_pages/