gempa

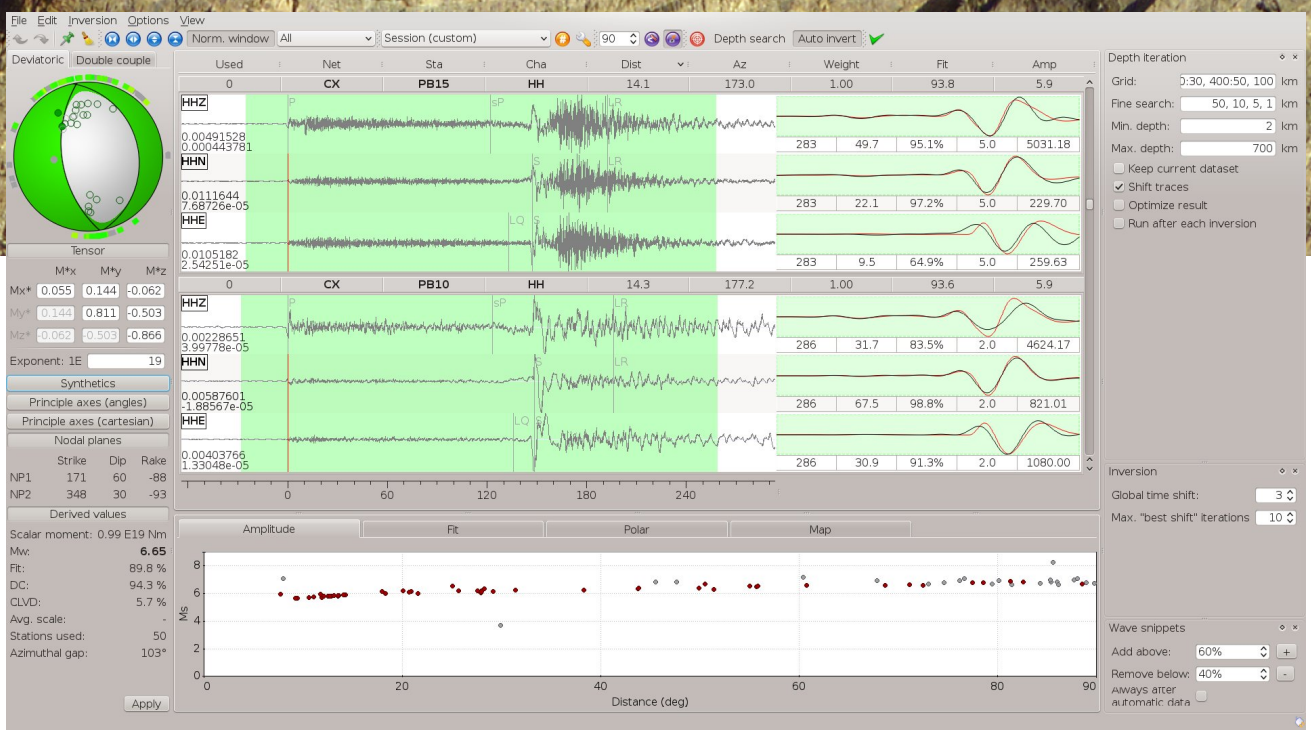
AUTOMT / MTV

GLOBAL EARTHQUAKE MONITORING PROCESSING ANALYSIS

Moment Tensor

Earthquake source parameters

Moment Tensor analysis



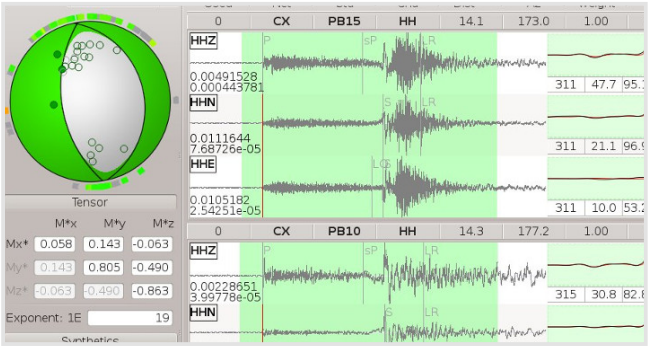
AUTOMT and MTV

gempa offers AUTOMT and MTV for automatic and interactive moment tensor determination (MT and CMT). Developed in cooperation with GFZ, the modules are fully integrated in SeisComP and the gempa products for earthquake analysis and tsunami early warning. For years AUTOMT and MTV have proven their quality at institutions worldwide. They allow gempa to offer software turnkey solutions for automatic and interactive

- Real-time seismic analysis in SeisComP,
- MT/CMT solutions,
- Tsunami simulation and observation in TOAST,
- Real-time shakemap generation in SIGMA,
- Bulletin generation and dissemination via many services: email, SMS, web in GDS or EQEvents.

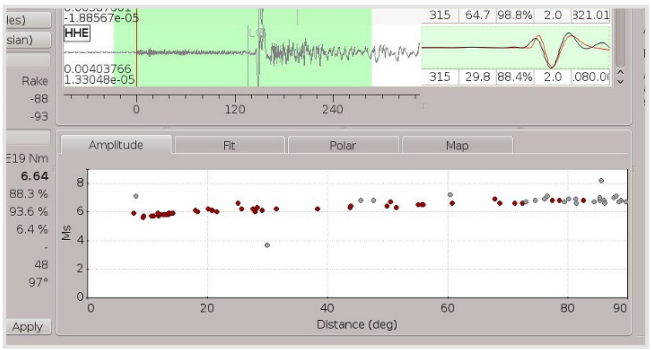
FEATURES

- Rapid moment tensor inversion in the time domain
- Real-time module for SeisComP
- Fits body-, surface-, mantle waves and W-phases
- Configurable profiles for magnitude ranges
- Fast and flexible access to Green's functions
- Interactive analysis, automatic processing: real-time (AUTOMT) and offline (MTV)
- 1D and 3D Centroid search (CMT)



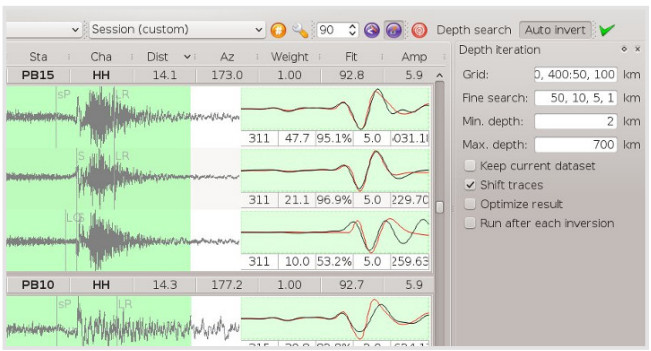
Automatic and Interactive Processing

MTV allows operators interactive, easy guiding of the inversion by checking observed and synthetic waveforms, selecting data and time windows and by adjusting the important control parameters such as filtering, weighting schemes, source location or earth models. The beachball maybe dragged changing the waveforms on the fly. Statistical tests provide solution assessment tools.



Feature–Based Data Selection

MTV provides multiple options to select or unselect data interactively based on data-dependent features. The features include amplitudes, fit, azimuth and distance, P-wave polarity or geographical location on the map. Having perfect control at any time, the user may carefully interact and guide the inversion.



Centroid Search

While hypocentres provide the locations where the earthquakes initiate, the centroid characterizes where the seismic energy is released. MTV and AUTOMT can compute 1D or 3D centroid locations automatically or interactively. In MTV users gain full control through advanced visualisation and user-friendly graphical windows.

TECHNOLOGY

Our moment tensor tools, AUTOMT and MTV, invert the full waveforms of three-component seismograms based on pre-computed Green's functions with 8 components. We use the well-established approach by Minson & Dreger (2003).

Before the actual inversion the software performs advanced quality control testing for data gaps, clipping and noisy data. It corrects for instrument response, detrends the data and applies configurable filtering. The waveform components, time windows, filtering and weighting can be choosen separately for any considered type of wave and even for individual traces. Users may manually select time windows and data zooming.

Different Green's functions databases, can be created and selected to account for global earth models and velocity models specific to local and regional networks.

While fitting Green's functions to the data, cross-correlation in the configurable time windows is applied compensating for phase shifts and model uncertainty. Goodness-of-fit and other parameters describe the representation of the observed data by moment-tensor solution.

Magnitude-dependent inversion profiles can be pre-configered, applied and modified interactively during inversion.

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