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SCISOLA: AYTOMATIC MOMENT TENSOR SOLUTION FOR SEISCOMP3

Nikolaos TRIANTAFYLLIS[1], Efthimios SOKOS[2] and Aristidis ILIAS[3]

Automated MT inversion procedures can provide important real time information for ground motion evaluation, tsunami warning and many other studies. Modern seismic networks with broadband sensors and real time digital telemetry provide the necessary information for these type of calculations.

ISOLA is a moment tensor retrieval software package which has been extensively used in source studies the last years (Sokos and Zahradník, 2008). It is based on multiple-point source representation and iterative deconvolution, full wavefield is considered, and Green's functions are calculated by the discrete wavenumber method of Bouchon (1981) and Coutant (1989). Moment tensor of subevents is found by least-square minimization of misfit between observed and synthetic waveforms, while position and time of subevents is optimized through grid search. The software was converted for automatic use by Triantafyllis et al. (2013) with the use of Linux OS bash code and other useful tools like nmxptool (Quintiliani, 2007). This initial implementation paved the way for an automatic moment tensor calculation procedure tightly connected with a common automatic processing software like SeisComP3.

The new code is called Scisola and it is an open-source python based software. It supports automatic calculation of moment tensors; the seismic events' notifications, stations' information and the corresponding data waveforms are provided by the SeisComP3 system through different utilities and services like slinktool and seedlink server respectively. The moment tensor is calculated through the ISOLA software in parallel mode using multiple threads through multiprocessing python libraries for much faster calculations. Furthermore the results of the calculations are saved in a database for a better data management. Scisola allows extensive configuration changes based on the needs of each researcher, through a user friendly graphical interface. Besides the real-time moment tensor operation, it also provides an “offline” mode for testing purposes or calculations. Finally, it supports a graphical review of the moment tensor calculation and the corresponding data fit while also supports the moment tensor revision in case the user wishes to alter the automatically suggested options. Scisola uses many open-source python libraries like ObsPy Beyreuther et al. (2010), matplotlib Hunter (2007), PyQt, MySQLdb and psycopg2.

The software will soon be freely available to the scientific community.

REFERENCES

[1] Postgraduate Student, University of Patras, Computer Engineering and Informatics Department, Rio 26504, Patras, Greece, triantafyl@ceid.upatras.gr
[2] Assistant Professor, Geology Department, Univeristy of Patras, Rio 26504, Patras, Greece, esokos@upatras.gr
[3] Technical Stuff, University of Patras, Computer Engineering and Informatics Department, Rio 26504, Patras, Greece, aristeid@ceid.upatras.gr

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