

Implementation of routine automated FMNEAR waveform inversion for focal mechanisms in Ecuador

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From mid-2018 onwards, we started to implement and test the FMNEAR waveform inversion (Delouis, 2014) at the Instituto Geofísico-Escuela Politécnica Nacional (IG-EPN) in Quito. The objective is to have it running routinely in near real-time in the course of 2019, so that focal mechanisms of earthquakes could be obtained in a fully automated way, within minutes to a few tens of minutes after their occurrence. FMNEAR works with broadband and strong motion records at local to regional distances (< 800 km from the epicenter). We use past events of magnitude comprised between 3.8 and 7.8 occurred in Ecuador in the recent years to check the instrumental responses and define the best strategy of data selection among the numerous broadband and strong motion stations of Ecuador. Results are compared to those obtained with other waveform inversions, in particular MECAVEL which has been extensively used to determine focal mechanisms of moderate size events in Ecuador (Vaca, 2017). In the meantime, the procedure to prepare and process the data automatically is being tested. Depending on data availability and location of the event with respect to the seismological stations, the results may be well constrained, or uncertain. Since quality and robustness indicators of the solutions are determined and provided automatically, the decision to use and/or publish them can be based on a predefined quality threshold. FMNEAR will help constituting a catalog of focal mechanisms in Ecuador, and in favorable cases will provide rapid solutions in near-real time.

Delouis, B., 2014. FMNEAR: determination of focal mechanism and first estimate of rupture directivity using near source records and a linear distribution of point sources, *Bulletin of the Seismological Society of America*, 104 (3), 1479-1500. doi: 10.1785/0120130151

Vaca, S., 2017. Interaction between tectonics, slow-slip processes and earthquake mechanisms across the North Andean sliver (Ecuador), *These de doctorat de Sciences de la Terre et de l'environnement*, Institut de Physique du Globe de Paris, Université Sorbonne Paris Cité, 105 pp.