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ABSTRACT BOOK
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Advanced tool for fault plane solution reliability assessment

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Assessing the quality of fault plane solutions is valuable for numerous activities, including seismotectonic analysis and estimating pore fluid pressures at hypocentral depths. Recently, new techniques have emerged to calculate pore fluid pressures based on focal mechanisms of seismic events and to monitor the temporal variation in the pore pressure field (Terakawa et al., 2014; De Matteis et al., 2024).

In this work, we introduce an updated version of the tool originally developed by Adinolfi et al. (2022), designed to evaluate both the reliability of focal mechanisms and the ability of a seismic network to analyze fault plane solutions and their associated errors. With a specified network configuration, the tool can be utilized to assess the reliability of a focal mechanism solution or to classify the quality of fault plane solutions provided by a seismic bulletin. Additionally, new statistical methods have been developed to more accurately determine the quality of a computed focal mechanism, as well as its associated uncertainties.

The tool is particularly helpful as it enables precise assessments of the reliability of focal mechanism solutions, which is essential when analyzing low-energy earthquakes. Such assessments are crucial for developing seismotectonic models, determining the geometry of seismogenic sources, and understanding regional strain and stress fields.

Adinolfi G.M. et al. (2022) - A functional tool to explore the reliability of micro-earthquake focal mechanism solutions for seismotectonic purposes. Solid Earth, 13, 65-83.

De Matteis R. et al. (2024) - Pore fluid pressure in St. Gallen geothermal field (Switzerland) based on earthquake focal mechanisms. Geophysical Research Letters, 51(6), e2023GL105127.

Terakawa T. (2014) - Evolution of pore fluid pressures in a stimulated geothermal reservoir inferred from earthquake focal mechanisms. Geophysical Research Letters, 41(21), 7468-7476.