Quick determination of the fault mechanism from initial P-wave amplitude distribution

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The problem of the real-time determination of the focal mechanism for Earthquake Early Warning Systems still lacks of a stable and validate solution. Currently, the automatic determination of the focal mechanism takes advantage of a grid of pre-computed solutions and is generally available within minutes after the earthquake detection and location.
Here we explore whether and how the distribution of the P-wave peak displacement amplitudes (Pd) can be used to constrain the fault geometry and determine the possible source focal mechanism, which is a crucial piece of information for rapid seismic hazard assessment during large earthquakes and for the fast issuing of potential tsunami alerts. In our methodology, as soon as a few seconds of P-wave signals are available at a set of recording stations, the observed Pd distribution is compared to the theoretical amplitude variation for a set of potential fault geometries. The comparison, through a dedicated algorithm, will provide a first-order identification of the best solution for the fault mechanism.