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Earthquake focal domain imaging by inverse downward wave field extrapolation

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By improving dynamic range of digital recording equipment, it is possible to record strong earthquakes, as well as extremely weak seismic events, like foreshocks or aftershocks. Many seismological networks consist huge number of seismological stations arranged in arrays, spatially designed for various tasks in order to resolve certain problems (tomography, surface waves study, etc). In this paper, finite-difference algorithm of 4th order in space and 2nd order in time, is used for solving 2D acoustic wave equation. In the first step, complex shape of earthquake occurrence is modelled. Recorded data are then used for inverse wave field extrapolation (full acoustic wave seismic migration in depth domain), obtaining final image of source of the earthquake. Also, according to complexity of the earthquake source shape, image quality is tested through varying parameters of the model, such as frequency content of P wave and stations distance. Cumulative process of 'stacking' the obtained successive earthquake images, could represent powerful tool of recovering the final effect of the nature of fault systems within focal domain in time.