

Source model of the 2014 Northern Nagano earthquake (Mj 6.7) by waveform inversion with empirical Green's functions

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The slip distribution model of the November 22, 2014 Northern Nagano earthquake (M6.7) is estimated by using the waveform inversion method with empirical Green's functions (EGFs). The main shock occurred just beneath the Kamishiro fault, which is the active fault located at the northern end of Itoigawa-Shizuoka Tectonic Line, however the aftershock distribution expands beyond the existing active fault zone. This suggest the fault rupture during the main shock also reaches such area.

Estimated source model displays the large slips on the shallow part near the hypocenter where the surface ruptures were observed, and the northern fault region where neither the active faults nor the surface earthquake faults were recognized. The secondary inversion procedure referring the slip distribution model as the initial condition reveals that the largest asperity at the northern fault area shows relatively high effective stress, radiating strong high-frequency earthquake motions. It implies the earthquake rupture propagating the area where the existing fault plane does not fully developed might be involved in high effective stress or stress drop.

Keywords: 2014 Northern Nagano earthquake, source model, active fault, inversion analysis