

Rupture process of the 2005 Fukuoka-ken-seihou-oki earthquake (M7.0)

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Strong motion records were analyzed to infer the rupture process of the 2005 Fukuoka-ken-seihou-oki earthquake. The observed P-waves are characterized with a slow initial part with the duration of about 3 s. This initial phase is seen for various azimuths and epicentral distances, suggesting that the long initial phase is source-origin and reflects the initial rupture stage with unusually long duration. I picked the onset of the 'main' phases, and determined the starting point of the main rupture and the time when the main rupture started. The starting point of the main rupture is located to the southeast of the hypocenter, and the origin time of the main rupture is 3.6 s later than that of the initial rupture. I also inverted the strong motion records to infer the overall feature of the spatial and temporal distribution of slip. One main area of concentrated slip was found to the 7 km southeast of the hypocenter at a depth of 5 km. The location of the high-slip patch agrees with the result of the travel-time analysis for locating the starting point of the main rupture. Peak slip amplitude on the high-slip patch reaches about 1.9 m. There was a small amount of slip to the northwest of the hypocenter. Hence the rupture propagation of this earthquake is essentially unilateral to southeast. The rupture area was limited close to the hypocenter for the first 2 s, and then the rupture started to spread but with a small amount of slip. Large moment release i.e., main rupture stage began at about 3 s after the starting of the initial rupture. The long initial phase was also observed for the 2000 Western Tottori earthquake. However, the background of the unusual initial phase is not clear.

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