

Comparison of source areas of the 2005 (M7.2) and 1978 (M7.4) Miyagi-Oki earthquakes, NE Japan, by seismic waveform inversion

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A large (M7.2) interplate earthquake occurred on 16 August 2005 in the Miyagi-Oki region, NE Japan, where large interplate earthquakes with magnitude of ~ 7.5 have occurred repeatedly at a recurrence interval of ~ 37 yrs. We compared coseismic slip distribution of the 2005 Miyagi-Oki earthquake with that of the previous 1978 Miyagi-Oki earthquake (M7.4) using joint inversion of near-field strong motion data and teleseismic waveform data.

For the 2005 event, we obtained a large coseismic slip area, which extends about 30km west from the hypocenter. For the 1978 event we obtained three large coseismic slip areas, which are located near the hypocenter, in the northern part of the focal area, and in the southwestern part of the focal area, respectively. Aftershocks and small repeating earthquakes are mainly distributed outside these large coseismic slip areas.

Large coseismic slip area of the 2005 Miyagi-Oki earthquake is overlapped with one of the three large coseismic slip areas of that of the 1978 event. The aftershock area of the 2005 event estimated using double-difference hypocenter locations is also partly overlapped with that of the 1978 event. These observations suggest that the 2005 event possibly ruptured one of the asperities, which ruptured as the 1978 event.