

Aftershock Distribution and the Mainshock's Fault Plane by the MJHD Method: Application to the Off East Coast of Honshu, Japan, Earthquake on December 7, 2012

2012/12/11

HURUKAWA Nobuo

Building Research Institute (BRI), Japan

Earthquake Information (USGS)

Origin Time: December 7, 2012 at 08:18:24 UTC

Hypocenter: 37.889°N, 144.090°E, 36.1 km (depth)

Magnitude: $M_w = 7.3$

Data: 'Latest Earthquakes in the World - Past 7 days' by the US Geological Survey

Events Relocated: Mainshock and aftershocks until December 10, 00h09m

Method: Modified Joint Hypocenter Determination (MJHD) by Hurukawa and Imoto

Results: Size of aftershock area: 60 km x 40 km

Fault plane (Second event): Nodal plane striking N-S dipping west

Comments: This is an earthquake doublet inside the Pacific Plate. The first event is a thrust earthquake occurring east of the Japan Trench (outer rise) at deeper part. The second event, which occurred 12 s after the first one, is a normal-faulting earthquake occurring beneath the Japan Trench at shallower depth.

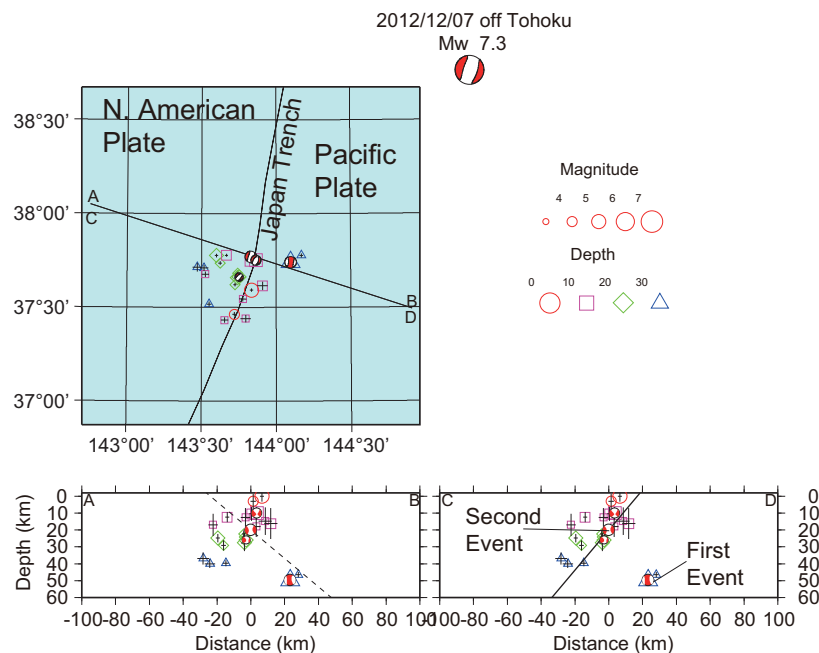


Figure 1. Hypocenters relocated by the MJHD method (Until Dec. 7, 23h00m). Global CMT solutions of the mainshock and aftershocks are also shown. Epicentral distribution and two vertical cross sections along A-B and C-D lines, which are perpendicular to strikes of the two nodal planes of the mainshock (second event), are shown. Two nodal planes are shown by lines in cross sections. The nodal plane corresponding to the fault plane is shown by a thick solid line.

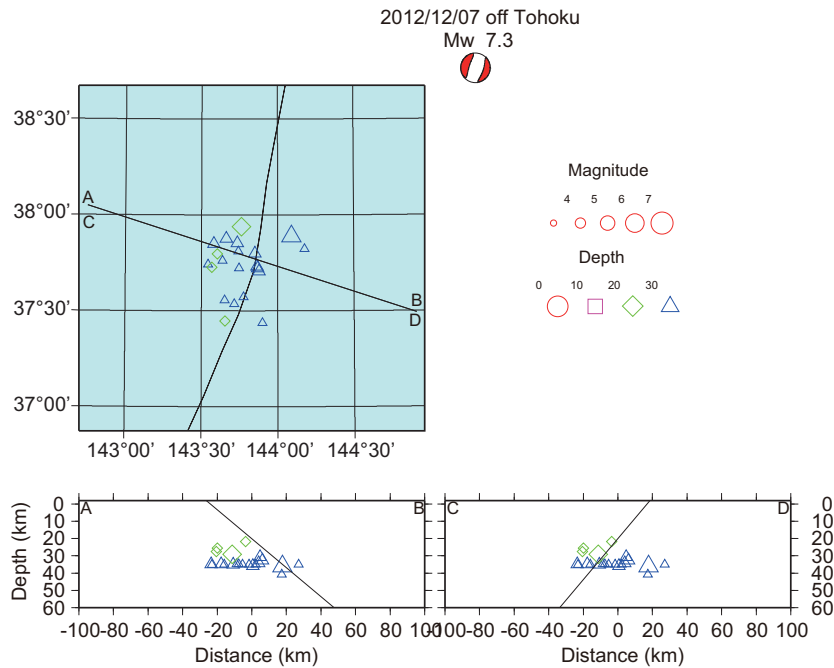


Figure 2. Hypocenters located by the USGS (Same period as Fig. 1). Two nodal planes of the mainshock (second event) are also shown by solid lines in cross sections.

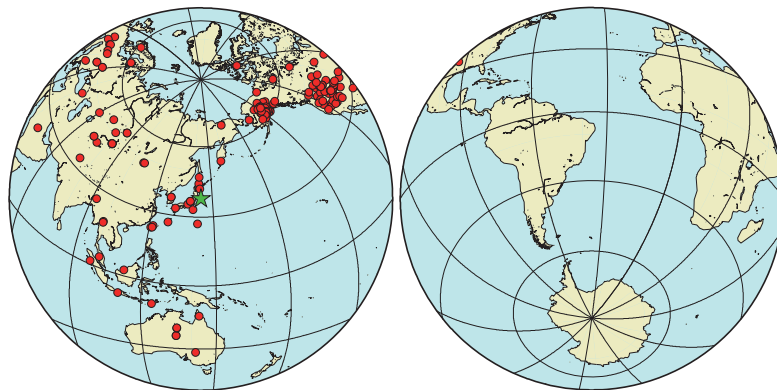


Figure 3. Stations used in relocation.

References

- Hurukawa, N., Quick aftershock relocation of the 1994 Shikotan earthquake and its fault planes, *Geophys. Res. Lett.*, 22, 3159-3162, 1995.
- Hurukawa, N. and Imoto, M., 1990, Fine structure of an underground boundary between the Philippine Sea and Pacific plates beneath the Kanto district, Japan, *Zisin (J. Seismol. Soc. Jpn)*, **43**, 413-429 (in Japanese with English abstract).
- Hurukawa, N. and M. Imoto, Subducting oceanic crusts of the Philippine Sea and Pacific plates and weak-zone-normal compression in the Kanto district, Japan, *Geophys. J. Int.*, 109, 639-652, 1992.