Aftershock Distribution and the Mainshock's Fault Plane by the MJHD Method: Application to the Western Sichuan, China, Earthquake on April 20, 2013

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Earthquake Information (USGS)
Origin Time: April 20, 2013 at 00:02:47 UTC
Hypocenter: 30.284°N, 102.956°E, 12.3 km (depth)
Magnitude: $M = 6.6$

Data: 'Latest Earthquakes in the World - Past 7 days' by the US Geological Survey
Events Relocated: Mainshock and aftershocks until 15h, April 21
Method: Modified Joint Hypocenter Determination (MJHD) by Hurukawa and Imoto
Results: Length of aftershock area: ~30 km
Fault plane: Nodal plane striking NNE-SSW dipping WNW
Comment: We compared the aftershock distribution with nodal planes by global CMT, USGS CMT, and USGS W-Phase. A nodal plane (Strike: 198°, Dip: 33°) by USGS CMT fits to the aftershock distribution best among them. The fault plane is located ~50 km SSW of the fault plane of the 2008 Sichuan earthquake (*Mw* 7.9).

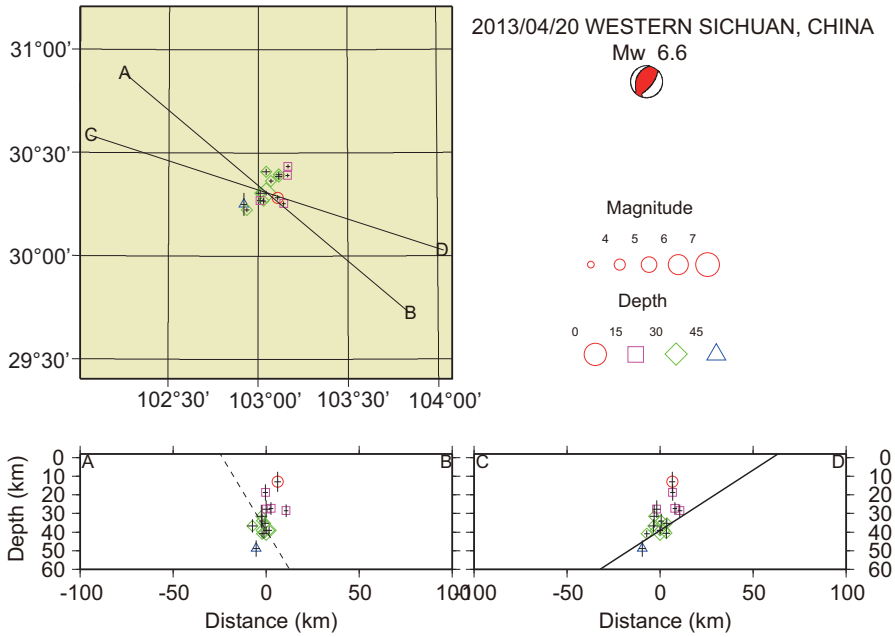

Figure 1. Hypocenters relocated by the MJHD method. USGS CMT solution of the mainshock is also shown. Epicentral distribution and two vertical cross sections along A-B and C-D lines, which are perpendicular to strikes of the two nodal planes of the mainshock, are shown. Two nodal planes are shown by lines in cross sections. The nodal plane corresponding to the fault plane is shown by a thick solid line.

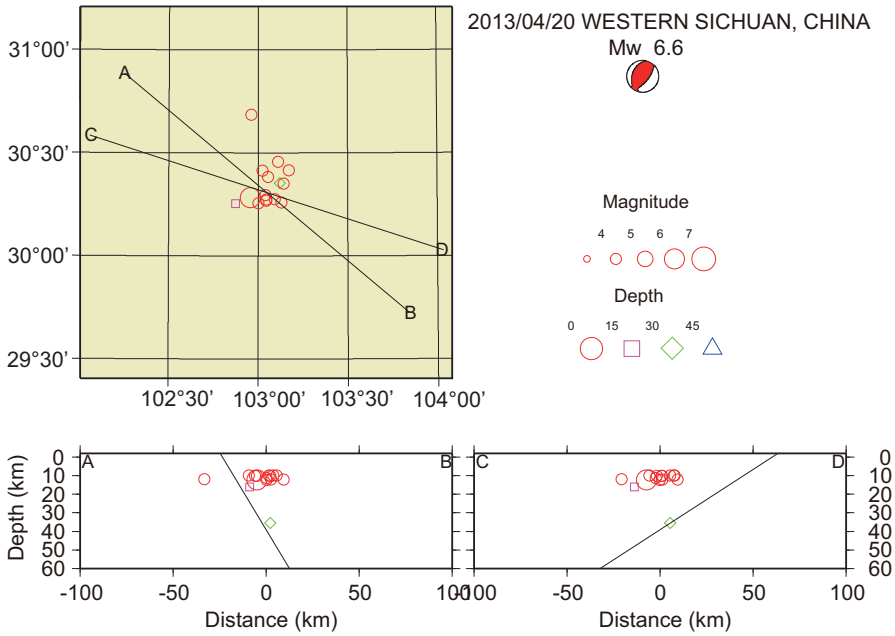

Figure 2. Hypocenters located by the USGS. Two nodal planes of the mainshock are also shown by solid lines in cross sections.

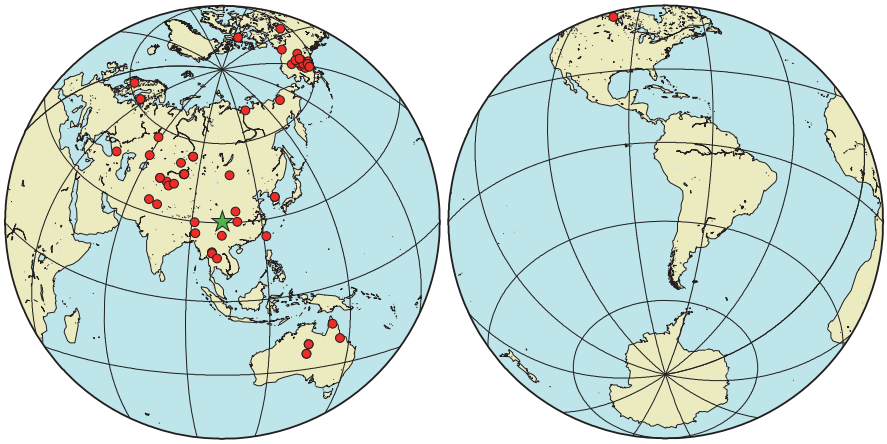

Figure 3. Stations used in relocation.

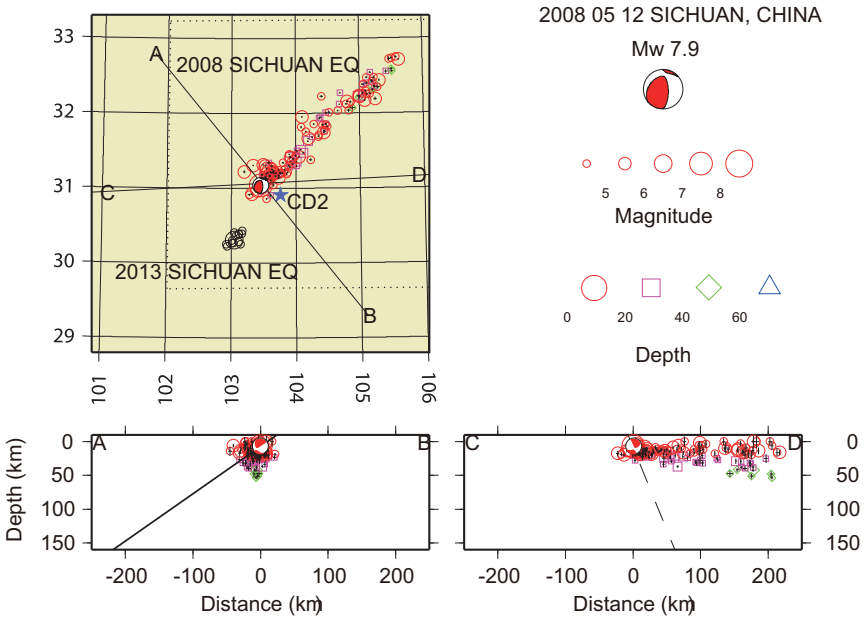

Figure 4. The 2008 Sichuan earthquake and its immediate aftershocks (Colored symbols: IISEE's aftershock distributions and corresponding fault planes). Black circles denote epicenters of the 2013 Sichuan earthquake and its immediate aftershocks.

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.

Cf. IISEE's aftershock distributions and corresponding fault planes: 1976 – 2009, $Mw \geq 7.0$
http://iisee.kenken.go.jp/cgi-bin/eqcatalog.newv6/mjhdcatalog_eng.cgi