巨大深発地震の6成分モーメントテンソル解析
Full moment tensor inversion for the large deep earthquakes

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We have performed full six component moment tensor inversions for the three large deep earthquakes: the June 6, 1994 Bolivia deep earthquake (M_w 8.2), the May 24, 2013 Sea of Okhotsk deep earthquake (M_w 8.3), and the 30 May 2015 off Bonin Islands deep earthquake (M_w 7.9) (Hara and Kawakatsu, 2014, JpGU; 2014, SSJ; 2015, SSJ). The VHZ channel waveform data were retrieved from the IRIS DMC. The data in the period range between 550 s and 1000 s, which are suitable to determine the isotropic component independently from other components (Hara et al., 1995, GRL, 1996, GJI; Kawakastu, 1996, GJI), were used. The Direct Solution Method (e.g., Hara et al., 1991, 1993, GJI) was used to calculate Green's functions for moment tensor inversion. The spatial and temporal grids for possible centroid locations and times are set and linear moment tensor inversions were performed for their pairs. The uncertainties of the analyses were estimated by the bootstrap method (e.g., Efron, 1982, SIAM).

For the 1994 Bolivia and the 2015 off Bonin Islands deep earthquakes, the isotropic components of the optimal solutions were in the ranges of the uncertainties obtained from the bootstrap analyses. For the 2013 Sea of Okhotsk deep earthquake, the isotopic component of the optimal solution was about 3 per sent (implosive) of the seismic moment. The uncertainty estimated from the bootstrap analysis was on the order of 1 per cent. This result is consistent with Okal (2013, AGU), although further uncertainty evaluations are necessary.

Hara and Kawakatsu (2015, SSJ) calculated the non-double couple component of the deviatoric moment tensor (epsilon, Giardini, 1983, 1984) of the sets of solutions obtained by the bootstrap analyses. The relatively large non-double couple components (around -0.08) were obtained for the 2013 Sea of Okhotsk deep earthquake, which implies the possibility that the moment tensor for this event is affected by velocity structures such as anisotropy in the source region.

キーワード：深発地震、モーメントテンソル、等方成分、非ダブルカップル成分
Keywords: Deep earthquake, Moment tensor, Isotropic component, Non-double couple component

