

Focal mechanisms of aftershocks of the 2008 M7.2 Iwate-Miyagi Nairiku earthquake and the stress field in its aftershock area

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A large earthquake with a magnitude of 7.2 occurred in the southwest part of Iwate Prefecture and northwest part of Miyagi Prefecture on June 14, 2008. Dense temporary seismic network was installed by the Group for the aftershock observations of Iwate-Miyagi Nairiku earthquake in 2008. This earthquake occurred in Ou backbone range, northeastern Japan. The contraction deformation is prominent in the backbone range including focal area of the present earthquake (Miura et al., 2002, 2004). From the distribution of aftershocks (Okada et al., 2009) it seems that westward dipping aftershock alignment is dominated. Dip of the westward dipping aftershock alignment is estimated to be about 40 degrees near the mainshock hypocenter. Eastward dipping aftershock alignment can be seen in the central and southern part. From GPS observations, the area with large coseismic slip was located to the SSW from the main shock hypocenter (Ohta et al., 2008; Inuma et al., 2008). In this study, we determined focal mechanism solutions using observed P-wave first motions at the temporary stations and the routine ones.

Most of focal mechanisms determined in this study are reverse-fault type. Some of them are strike-slip type. Focal mechanisms of normal-fault type are few. P-axis of focal mechanisms of reverse fault type tends to orient to E-W or ENE-WSW direction. We determined stress field by stress tensor inversion from focal mechanisms in the entire focal area. The maximum principal stress direction is ENE-WSW. This corresponds to the direction of horizontal principal-strain in this area (Miura et al., 2002). However, P-axis is oriented to NW-SE direction in the central part of the focal area where large coseismic slip occurred. We infer that the large coseismic slip disturbed the stress field in this area.