

Spatial distribution of stress field around Niigata prefecture inferred from a marine and land seismic network

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The Niigata-Kobe Tectonic Zone (NKTZ) (Sagiya et al., 2000) is placed in the eastern margin of the Japan Sea, many large earthquakes occurred within NKTZ. To understand the generation mechanism of these earthquakes and a formation of the NKTZ, it is important to obtain detailed hypocenter distribution around the NKTZ and to estimate stress field around the region. From focal mechanisms of aftershocks of the 2004 Chuetsu earthquake and the 2007 Chuetsu-oki earthquake, the stress fields around the source regions were estimated (Kato et al., 2006; Imanishi et al., 2006; Imanishi and Kuwahara, 2009). It is difficult to estimate stress fields in the marine region around Niigata prefecture precisely, because it is difficult to locate precise hypocenters in offshore regions only land seismic stations. Precise hypocenter locations determined by using oceanic bottom seismometers enable us to estimate precise stress fields in marine area. Shinbo et al. (2010) determined hypocenters by using 10 long-term ocean bottom seismometers off Joetsu, Niigata prefecture and land seismic stations from Dec., 2008 to Oct., 2009 and estimated focal mechanism solutions. In this study, we examine stress tensor inversion using these focal mechanism solutions and investigate spatial distribution of stress field from source region of 2004 Chuetsu earthquake to the marine region around Niigata prefecture.

We calculated the stress field by applying method of Hardebeck and Michael (2006) and estimated the principal axes. As the result, azimuth of maximum principal stress is from NW-SE to WNW-ESE and its dip is close to be horizontal. Dip of minimum principal stress is close to be horizontal near the mainshock of 2007 Chuetsu-oki earthquake and is close to be vertical near the mainshock of 2004 Chuetsu earthquake and in the marine region around Niigata prefecture. This result show the stress field becomes the strike-slip type near the mainshock of 2007 Chuetsu-oki earthquake and becomes the reverse fault type in other regions. We suggest the local variation in stress field.