

Stress field in the source area of the 2004 Mid Niigata Prefecture Earthquake inferred from the data of joint observation

Masahiro Kosuga[1]; Kazunori Murata[2]

[1] Sci. & Tech., Hirosaki Univ.; [2] Earth and Environ. Sci., Hirosaki Univ.

We have investigated the spatial distribution of focal mechanisms in the source area of the 2004 Mid Niigata Prefecture (Niigata Chuetsu) Earthquake using the combined data set of temporary observation. The data was provided by the research team of aftershock observations for the Chuetsu Earthquake.

About two-thirds of well confined 545 focal mechanisms are reverse-fault type with WNW-ESE trending P-axes. Minor strike-slip events are distributed in the northern part of aftershock zone and an area between the Higashiyama and the Uonuma Hills.

Stress tensors determined by using the focal mechanisms clearly exhibit depth variation in the stress field. The field in the part shallower than 6 km is characterized by relatively large ratio of minimum principal stress to the maximum stress, and larger directional variation of stress axes. On the other hand the stress field in the deeper part are uniform with E-W trending horizontal compression. However, the maximum principal stress axis are rotated to NW-SE as the location moves toward the eastern part of aftershock zone that form an eastward dipping fault plane. In addition the dip angle of maximum principal stress axes changes from horizontal in the eastern part of aftershock zone to westward dipping in the zone near the mainshock. The axes seem to direct the hypocenter of mainshock. This variation of maximum principal stress axis suggests stress concentration in an area located in the footwall block of mainshock fault.

The ratio of the minimum principal and the maximum principal stress take large value in an area between the Higashiyama and the Uonuma Hills where the strike-slip events occurred. The area with large value moves closer to the mainshock hypocenter as the depth increases. This observation is also suggestive of stress concentration in an area near the mainshock hypocenter.