Japan Geoscience Union Meeting 2010
(May 23-28 2010 at Makuhari, Chiba, Japan)

SSS017-07 Room: Exibition hall 7 subroom 1 Time: May 26 10:45-11:00

Present-day stress field along the Itoigawa-Shizuoka tectonic line active fault system by microearthquake observation

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An integrated research project for active fault system along the Itoigawa-Shizuoka Tectonic Line started in 2005 as a 5-year long national project of MEXT (the Ministry of Education, Culture, Sports, Science and Technology, Japan). The main purposes of this project are to improve accuracy of the long-term earthquake forecasting and strong ground motion prediction, and to understand the present-day crustal activity. In this presentation, we report the present-day stress field along the fault system revealed by microearthquake observations.

Earthquake focal mechanisms are the most fundamental information of the stress state. In the case of microearthquakes, however, it is difficult to obtain a unique focal mechanism solution, because the number of stations detecting events decreases and their azimuthal coverage becomes poor. Therefore, we have made temporary observations in and around the Itoigawa-Shizuoka Tectonic Line active fault system since September 2005, changing the observation region. The events were recorded at sample rates of 200 Hz in continuous mode and by off-line recording with GPS clock. We determined focal mechanism solutions using absolute amplitudes and P-wave polarity, which made it possible to increase the number of uniquely constrained focal mechanism solutions. Stress fields deduced from suites of focal mechanisms suggest that except for the southern part of the east Matsumoto basin fault, they agree well with the faulting style and slip sense that were estimated by the geological and geomorphologic survey. Although the east Matsumoto basin fault has been considered to be an east-dipping reverse fault, Kondo et al. (2006) found geomorphic features indicating strike-slip movement along the southern part of the fault. It is interesting that the present-day stress field estimated in this study agrees with the observation of Kondo et al. (20 06).

Stress fields deduced from suites of focal mechanisms provide us information about not only the faulting style but also the direction of principal stresses and stress ratio. The information will be useful for an evaluation of simultaneous rupture of multiple fault segments, an improvement of accuracy of the long-term earthquake forecasting, and so on.

Acknowledgements. The seismic observation was supported by the Ministry of Education, Culture, Sports, Science and Technology, Japan. The seismograph stations used in this study include permanent stations operated by NIED (Hi-net), JMA, ERI, Nagoya University, and DPRI.

Keywords: microearthquake observation, Itoigawa-Shizuoka tectonic line active fault system, stress field, focal mechanism