

Crustal movement of North Nagano earthquake and seismotectonics of the Sakae - Tsunan - Matsunoyama district

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On March 11th in 2011, off the Pacific coast of Tohoku Earthquake (M9.0) occurred off Miyagi. Next day, on March 12th in 2011, North Nagano earthquake (M6.7) occurred on the boundary between Nagano and Niigata prefecture. This area is located in Shinanogawa seismic belt (Ohmori, 1907) and Niigata-Kobe tectonic zone (Sagiya et al., 2000).

By GEONET GPS analysis, Matsunoyama (0244) displaced 39.3 cm toward the northeast and Naganosakae (0982) displaced 4.2 cm toward the north. But, on Niigata-Kobe tectonic zone maximum shortening occurs in an E-W trend.

In this study, in order to reveal temporal change in displacement field at and around the time of those earthquakes and to examine characteristics of the earthquake source fault, to elucidate a cause of displacement, I analyzed the GEONET GPS data by using GAMIT software (ver.10.42) and RTD software (ver.3.5). Also I presumed characteristics of the source fault inferred from aftershock distribution by utilizing Seis-PC software (Nakamura et al., 2005), and estimated ground surface deformation due to shear and tensile faults by using DCSTN software (Okada, 1992).

Concluding remarks resulted from the study are as follows.

At the moment when the North Nagano earthquake occurred, Matsunoyama (0244) performed 40.3 cm displacement northeastward, while Naganosakae (0982) displaced 11.8 cm northwestward. The North Nagano earthquake caused a large of displacement to epicenter surrounding area, but postseismic crustal movement due to the Tohoku -Pacific Earthquake progress remarkably after the North Nagano earthquake.

There is a possibility that an unknown fault was active by aftershock distribution. Displacement of GPS permanent stations have been not necessarily affected with faulting direct. Coseismic development of the fold structure is implied as the cause.

Keywords: North Nagano earthquake, GEONET, faults, Matsunoyama dome, geopressure