Preliminary Report on Northeastern Nagano Earthquake (Mw6.2), Nov. 22, 2014

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On November 22, 2014, the northeastern part of the Nagano prefecture in Japan felt strong ground motion. The Japan Meteorological Agency (JMA) estimated the scale of the earthquake as Mj6.7 (Mw6.2), and the hypocenter depth as 5km. The focal mechanism indicates lateral faulting, while the CMT solution indicates reverse faulting. This implies the earthquake did not occur on a simple planar fault. The source area is located on Itoigawa-Shizuoka Tectonic Line, and more precisely along Kamishiro active fault. Several surface ruptures were reported along the Kamishiro fault, and its maximum up-down displacement was about 90 cm.

Seismic intensities of 6-lower on the Japan Meteorological Agency (JMA) scale were observed at Nagano city, Otari village, and Ogawa village. The maximum peak ground acceleration and velocity among the available ground motion records were 572 cm/s² and 61 cm/s, respectively, at the K-NET NGN005 station (organized by National Research Institute for Earth Science and Disaster Prevention) in absolute values on horizontal components. The ground motion contains a strong pulse in the initial phase, which may correspond to the surface faulting, because the NGN005 station is located nearby surface ruptures with about 40 cm of vertical displacement.

The earthquake caused severe damages on residences only in a limited area around Horinouchi, in Kamishiro, Hakuba village. Our preliminary field survey indicates that more than 30% of wooden houses were severely damaged in the area. Open cracks on the ground surface were also observed along the level line. The residential damages must be due to strong ground motions because the residual displacements of the cracks were not significant, and also the surface rupture did not pass through the area. Researchers in Japan have begun to investigate why the severe damages were concentrated in the area, based on precise damage reconnaissance, aftershock observations at temporal seismic stations, and several geophysical exploration surveys.