Active tectonics along the eastern marginal fault zone of Yokote basin NE Japan

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Typical reverse faults appeared along the western (Yokote basin) and eastern foot of the Mahiru range, associated with The Rikuu Earthquake (Mj7.2) of 1896 in Northeast Japan. These surface faults trace are very complex in the curve and echelon. The eastern marginal fault zone of the Yokote Basin consist of four main surface ruptures, about 35 km long, Obonai fault, Shiraiwa fault, Ota fault and Senya fault, depending on their continuity and strike (Matsuda et al., 1980). We carried out the seismic reflection profiling across these faults to clarify the active tectonics of this area based on the data of tectonic geomorphology and structural geology and furthermore, to discuss its development. In generally the seismic source was mini-vibrator trucks, with 20seconds of 10-100Hz signals at 10m intervals. The sweep signals were recorded by a digital telemetry system (GDAPS-4a) with 10 Hz geophones. The obtained seismic reflection data were processed by conventional Common mid-point (CMP) methods, including post-stack migration and depth conversion.

The resulting seismic reflection profile reveals a thrust structure beneath these areas. At the Center of Senya hills there are two thrusts and one high angle reverse fault (1996 Seismic Line). Senya fault is an active frontal emergent thrust with flat and ramp structure. Although, in the Unjono04 seismic line (the north part of Senya fault), the depth of the flat-ramp structure gradually shallow, and hanging-wall is complex deformation, where the flexure scarp accompanied with antithetic faults formed on the terraces. In the Kawaguchi03 seismic line (Ota fault), there are two thrusts. One is master fault which is boundary of the mountain and basin, another is concealed fault branched from the master fault, which form a flexure scarplet on the alluvial fan in the basin. In the Shiroiwa05 seismic line (Shiroiwa fault), there are low angle fault reach to ground from about 1km depth. And the flat-ramp structure like Senya fault is not clear.

Thus, according to these results, it is clear that fault and fold geometories are different respectively. These differences of the subsurface structure and the evolution of thrust are inferred to due to the difference of the geologic conditions in front of the master fault.