

Seismic reflection profiling of the eastern marginal fault zone of the Yokote Basin, Northeast Japan

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The eastern marginal fault zone of the Yokote Basin is an active reverse fault bounding the Mahiru Mountains of the Ou Backbone Range. Its last event was recorded as the Riku-u earthquake (M7.2) in 1896, accompanied by 30km long surface fault. This fault zone consists of four components, Shiraiwa fault, Ota fault, Senya fault and Kanazawa fault depending on their continuity and strike. Our geomorphic air-photo reading suggests that the thrust front migration has been progressing along the Ota fault. In 2003 and 2004, we carried out the seismic reflection profiling along the Ota fault and the northernmost of Senya fault, to clarify the subsurface structure of fault migration and its evolutionary condition and timing.

The Kawaguchi03 profiling (7.3km long) and Unjono04 profiling (2.6 km) were set to analyze the seismic underground images, normal to the N-S trending Ota fault, and to the NE-SW trending Senya fault, respectively. These experiments adopted a mini-vibrato as a seismic source, with 20 seconds of 10-100 Hz signals at 10 m to 5m spaces. The signals in this experiment were recorded by a GDAPS-4 digital telemetry system with 180 channels in the Kawaguchi03 profiling, and with 260 channels in the Unjono04 profiling, respectively, at a sampling rate of 2-ms, where the geophone units were put at a 10 m interval. We processed the field record by the routine of data acquisition using F-X prediction filter and F-D migration technique. Preliminarily, our analysis obtained the migrated time section. Our analysis obtained the migrated time section. The reasonable reflective signals are recognized below 1.0s TWT in the basin sediments. A reflector around 0.4s below the west geomorphic flexure seems to be a branching thrust fault. We judged that a new thrust has finely been migrated from the master Ota fault in the Kawaguchi03. The flexure scarp accompanied with antithetic faults is judged to be generated by the reverse faulting in the Unjono04. The time difference in the thrust front migration along the fault zone is probably originated from the depth of mud stone in the basin and the location to the master fault.

We judged that a new thrust has been migrated from the master Ota fault, younger than the same structure of the Senya fault (Sato, et al., 1998).