

# Progressing thrust front migration and fault activity in the Yokote Basin, Northeast Japan

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## 1. Introduction and purposes

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. 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-timing. Furthermore, we performed the geomorphic chronology using Quaternary techniques (C14 dating, OSL dating and tephrochronology), to decide the late Quaternary activity of the fault zone.

## 2. Seismic reflection profiling and its results

The Kawaguchi03 profiling (7.3km long) and Unjono04 profiling (2.6 km) were set to analyze the seismic underground image, normal to the N-S trending Ota fault. This experiment adopted a mini-vibrato as a seismic source, with 20 seconds of 10-100 Hz signals at 10 m spaces. The signals in this experiment were recorded by a GDAPS-4 digital telemetry system with fundamentally 180 channels 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. 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 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.

## 3. Geomorphic chronology and late Quaternary activity of the fault

Geomorphic fluvial terraces were developed along the rivers from the Mahiru Mountains around the fault, alluvial fans in the basin side. They are classified into seven levels: Terrace I to Terrace VI in descending order. Terrace I is estimated to be ca.150-200ka, Terrace II to ca.100ka, Terrace III to ca.30-50ka, Terrace IV to ca.20ka, Terraces V and VI to Holocene. The mean vertical slip rate is largest, 0.3mm/yr, in the Senya fault among the compositional faults ranging 0.2 to 0.3 mm/yr in range.