

Progressing thrust front migration and late Quaternary activity of the eastern marginal fault zone of the Yokote Basin

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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, 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 tephra), to decide the late Quaternary activity of the fault zone.

2. Seismic reflection profiling (Kawaguchi03) and its results

The Kawaguchi03 profiling, 7.3km long, was 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 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 not 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 been migrated from the master Ota fault, younger than the same structure of the Senya fault (Sato, et al., 1998).

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. They are classified into seven levels: Terrace I to Terrace VI in descending order, probably emerged in middle Plesitocene to Holocene time. The samples useful for chronology were collected from terrace deposits and overlying weathered soil-loess (8 samples on C14 dating, 15 samples on OSL dating and 300 samples on tephra which are under analysis). Optical geodetic surveying was also done across the fault line displaying distinct and cumulative fault deformation. All results from the above analysis will be finished soon, and its synthesis will be able to refer to the late Quaternary activity demonstrated by vertical slip rates.