# Subsurface Structure of the Western Boundary Fault Zone of the Nagano Basin, Central Japan

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1. Introduction

The Western Boundary Fault Zone of the Nagano Basin is a zone of NE-SW trending reverse faults, which border the eastern margin of the Northern Fossa Magna (NFM) with length of about 52 km length. The NFM is a half graben, which was developed in the conjunction with the opening of the Japan Sea. The thickness of Neogene sediments that filled the NFM half graben is over 6 km. The NFM basin fill has been subjected to strong horizontal shortening since tectonic inversion occurred in Pliocene (Sato & Ikeda, 1999; Ikeda *et al.*, 2002; Elouai *et al.*, 2004). Itoigawa-Shizuoka Tectonic Line is considered as an active main thrust, which borders the western margin of the NFM. On the other hand, the Western Boundary Fault Zone of the Nagano Basin is considered as an active back thrust, that developed on the hanging wall side of the Itoigawa-Shizuoka Tectonic Line (Ikeda *et al.*, 2002). Elouai *et al.* (2004) estimated about 27 km of extension, when Japan Sea was opened, and about 11 km shortening since the Pliocene by interpretation of deep seismic profiling. Elouai *et al.* (2004) suggest that the NFM has a large amount of shortening. But, there are no investigation of shallow seismic profiling and interpretation of sallow subsurface structure of the Western Boundary Fault Zone of the Nagano Basin. Then, in this study, to reveal the subsurface structure and development of this fault zone, we carried out a high-resolution seismic reflection survey and gravity survey along the Saigawa River, southern Nagano City.

2. High-resolution seismic reflection profile

Our high-resolution seismic reflection data were acquired along the Saigawa River in September to October, 2005. The length of the seismic line is 4.7 km. The seismic line was establish across the Komatsubara fault, southern part of the Western Boundary Fault Zone of the Nagano Basin. The source used in this seismic survey was a minivibrator (T-15000). The source and receiver spacing was 10 m. The seismic signals were recorded with a digital telemetry system (JGI, GDAPS-4). The obtained seismic reflection data were processed by conventional Common mid-point (CMP) methods, using digital seismic analysis system (JGI, SuperX-C).

3. Gravity survey

The length of our gravity line was 24.7 km, which include our seismic line. The total number of gravity stations is 151. The interval of gravity stations is 100 m in the neighborhood of the Komatsubara fault, and 200-300 m on the eastern and western parts of the gravity line. A LaCoste & Romberg G-type gravimeter was used. The obtained gravity data were processed to Bouguer gravity anomaly. Terrain corrections was made by using 50 m DEM (Degital Elevation Model) that was provided by Geographical Survey Institute. The effect of the subducted Pacific plate was removed from the gravity data, and then we obtain Slub Residual Gravity Anomaly. The density structure was estimated by the 2-dimensional Talwani's method.

4. Interpretation of the subsurface structure

The seismic section after careful data processing shows fairly flat Quaternary basin fills in the eastern part of the seismic line. This flat Quaternary basin fills were tracked toward the western part of the seismic line from the eastern end. In the western side of the seismic line, west-dipping low frequency reflections are dominant. This low frequency waves was interpreted from surface geology as an Ogawa formation Susobana tuff of Late Miocene age. The Komatsubara fault of the Western Boundary Fault Zone of the Nagano Basin is a west-dipping fault, that border between the west-dipping Neogene strata and the Quaternary basin fills. Density structure of this fault zone is now in progress with use of the seismic reflection result. In this presentation, we will report the subsurface structure of this fault zone on the basis of high-resolution seismic profile and gravity data.