

## Late Quaternary river terrace development and estimation of vertical crustal movement along branches of the Tone River

MORITA, Yasuhiko<sup>1\*</sup> ; SUGAI, Toshihiko<sup>2</sup>

<sup>1</sup>Department of Earth and Planetary Science, Graduate School of Science, The University of Tokyo, <sup>2</sup>Department of Natural Environment, Graduate School of Frontier Sciences, The University of Tokyo

### Introduction

Vertical crustal movement can be estimated by seismologic, geodetic, geomorphological and geological approaches in short order. For prehistorical crustal movement, estimation based on geomorphological and geological evidence is valid. While marine terraces have been used in coastal areas (Koike and Machida, 2001), it is necessary to use a different method in inland areas. When similar longitudinal profiles of the river floor are made under similar climate conditions and similar sea levels, relative height between the two terrace levels formed in two successive full-glacial periods may indicate vertical crustal movement occurred in between the two full-glacial periods. This method is called TT (Terrace to Terrace) method (Yoshiyama and Yanagida, 1992). The accuracy of the crustal movement evaluation is considered to be reduced. For these reasons, there is a need for basic study to know the applicable accuracy and limitations of the TT method.

### Purpose of study

Tajikara(2000) estimates the crustal movement in Tohoku region based on the TT method. There is also a comprehensively study classified the longitudinal profiles, which is an important element in our study, of the many rivers of Japan as an approximation function form (Honda and Sugai, 2011). By combining these results with this study, it is possible to analogize the tendency of longitudinal profiles change which is not yet fully understood in inland. The purpose of this study is to expand the range to which we can apply TT method in inland.

### Method of study

In this study, we conducted a survey in the Kanna river area where fluvial terrace levels have been preserved well. First we made a landform classification by aerial photo interpretation, and we measured relative height of terrace surface using a simple laser surveying instrument. The major elemental composition of the wind stratification such tephra covering the terraces were analyzed using SEM EDS. We measured the relative height of fluvial terraces using 1: 25000 topographic maps of contour interval 10 m and 1: 2500 by the city planning map of contour interval 2 m along with laser meter, and we have created longitudinal profiles of the Kanna River bed and terrace levels.

### Results and discussion

In the middle terrace of downstream region, AT tephra with age of 29ka was observed. Although marker tephra from the lower layer was not detected, the middle terrace probably can be correlated with MIS 6 because of such several conditions as gravel weathering below the layer and dissected terrace plain while the lower terrace has developed on wide area and hardly dissected. TT value is 19-29 m between MIS 6 and MIS 2, and average of crustal movement can be estimated to be about 0.14 - 0.22 mm/yr. In upstream region fluvial terraces can be classified into three levels in Sanchu area. The highest terrace possibly was formed in MIS 12. We made series of sampling in the upper terraces outcrop, and tried to determine the age of older (we suppose) than the last glacial age terraces by the tephra analysis.

### References

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