

Issue of estimation of uplift in the inland area during late Quaternary

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1. Introduction

A terrace is useful to estimate uplift of the late Quaternary for evaluation of the future uplift, which is required for siting of the high-level waste disposal site. Atlas of Quaternary Marine Terraces in Japan Island (ed. Koike and Machida, 2001) compiled the data of marine terraces and uplift data around seaside areas in Japan. On the other hand, it is short of the information about uplift on inland areas. The objective of estimation of uplift in an inland area is to contribute to the evaluation of the preliminary investigation areas, and to give the information concerned with the two-dimensional crustal movement. In this presentation, we talk about the estimation method of uplift using river terraces and its issue, especially terrace correlation methods.

2. Uplift estimation in an inland area using river terraces

A value of relative height between the stage 6 river terrace and the stage 2 river terrace are considered to indicate uplift during those stages on the promise that a river profiles regularly changed according to the cyclic fluctuation of climate and sea-level (TT value). Similarly, a value of relative height between the stage 5 river terrace and the present river floor can be used as an indicator of uplift during stage 5 and stage 1 (FS" value). However, researches of the estimation of the inland areas using these indicators, because it is difficult to date a formation age of a terrace of middle Pleistocene.

3. Issue of the terrace correlation

In general, a geomorphological survey using air-photographs is carried out, and field investigation is done to obtain data for terrace correlation. It is necessary for dating of terrace formation ages to detect ages of both the top of the terrace deposit and the base of the covered one. Recently, ¹⁴C-method and tephra chronology are mainly used for dating of terrace formation ages. However, some basic problems on terrace stratigraphy are left even if a tephra layer whose age is known is detected. When an age-known tephra layer is detected only in a covered layer, a terrace age is often underestimated because it is difficult to interpret unconformity between a terrace deposit and a covered one. On another occasion, a mistake of a boundary with a terrace deposit and a covered one gives wrong terrace correlation. It has a great influence to the uplift estimation using river terraces. For example, when a stage 6 river terrace is considered to be stage 5, the FS" value are used instead of the TT value and the wrong FS" value is often larger than the TT value.

4. Issue of dating of terrace formation ages by the OSL method

Recently, researches of the OSL method are carried out for dating of late Quaternary sediment. The OSL method has not only technical problems but also practical ones for the terrace dating. Hataya and Shirai (2003) have carried out the OSL dating of shoreface-foreshore-backshore sequence of the marine terrace deposit whose terrace deposit was dated stage 5e-5c using tephra. OSL ages of the foreshore unit are in good agreement with the geological estimated age. On the other hand, the OSL ages of the shoreface unit are older, and those of the backshore are younger. Tanaka et al.(2001) has done the OSL dating of sand bar layers in the 60-80 ka terrace gravel, and obtained reasonable results, but their OSL ages from flood plain deposits are much older than the geological estimated age. These results show that the layer that the OSL method is applicable for terrace dating is specific.

5. Summary

The most necessary technique for uplift estimation using terraces is the terrace correlation method. The terrace correlation requires not only dating methods but also stratigraphic techniques. We think that it is the most important to arrange the mutual relationship of age data, geomorphologic data and geological data in consideration of the issue we described above, and to make clear a stratigraphic position of a dating sample.