

Trial of uplift and erosion estimation in coastal sea area by extrapolation of the land area model

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1. Introduction

The research meeting of the METI in 2015-2016 discussed research issues of geological disposal in the coastal area [1]. After that, this study began in August 2016. In this study, finally, we'd like to estimate the downward erosion under the coastal seafloor.

2. Method

We use the conventional method considering the future preliminary investigation for geological disposal siting. In the land area, we mapped the distribution of terraces by aerial photograph interpretation, and examined the correlation and dating of marine and fluvial terraces, by compiling the terrace age data of the previous study [2, 3 etc.]. We drew topographical cross sections along the main rivers, and project marine and fluvial terraces to them. On the sections, we measure the relative terrace height which is defined as an index of the late Pleistocene uplift [4, etc.], and can grasp the uplift distribution in the land. Then, we construct a model of uplift motion after late Pleistocene in three dimensions on the basis of the uplift distribution and extrapolate it to the sea. On the other hand, in the sea, we investigate the alluvium distribution from the marine acoustic exploration records, and estimate the topography under the alluvium. We consider the depth of the valley as that of the download erosion.

3. Case study on the desk

We have conducted the case study on the Miyazaki plain, which is known to have terraces widely distributed and the amount of uplift after the late Pleistocene is relatively large.

(1) Survey in the land

There is no active fault along the shoreline of the Miyazaki plain, we constructed a monotonous tilt in one direction, which is a flat plate approximation model as the first model. When we only used the data of the terraces of the marine oxygen isotope stage (MIS) 5e, we got a model that tilts north along a nearly straight coastline. This hypothesis is also said in previous studies. On the other hand, considering the data of terraces of MIS5c additively, we can obtained a model tilting to the sea.

(2) Survey of the sea

The topography under coastal sea under alluvium is contrasting in the north and south of the study area. The valleys are deeper and the topography is more complex in the south than in the north. Also, according to the basic map of sea published by Japan Coast Guard, in the southern part the rocks of the Neogene sedimentary rocks (Miyazaki Group) are widely distributed, and in the north the alluvium deposits cover lower layers. These differences may reflect the amount of uplift in the sea.

4. Discussion and future tasks

Comparing the two uplift models, a difference in estimated uplift of several tens meters per 100,000 years will occur in the south sea area, where uplift in the land area is relatively large. In this way, when a several uplift models are obtained, they are considered as uncertainty. The accuracy and reliability of the terrace correlation and dating greatly affects the estimation of the uplift and the uplift distribution. Therefore, the sophisticated terrace correlation and dating can decrease uncertainty. Moreover, geological structure is useful data to choose the models.

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Reference:

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