Uplift estimation in coastal sea area by extrapolation of the land area model and its uncertainty

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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, we began this study in August 2016[2]. 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 [2, 3, 4, 5 etc.]. We drew the distribution map of the late Pleistocene uplift in the land using these data. 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. Next, we have verified the model by discussing the uplift history from the tertiary to the recent. Furthermore, we’ ve discussed uncertainty of the extrapolation of uplift late from the land to the sea by the sensitivity analysis.

3. Case study

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) Basic uplift model

Our basic model of the uplift in the case study area is a flat plate approximation model, which means monotonous tilting in one direction [2].

(2) Verification of uplift model by discussing the uplift history

The geological structure of the Neogene system shows tilting movement in the ESE direction [6]. The geomorphology and geological distribution of Pleistocene suggest tilting movement in the ENE direction. In addition, it is now rotating counterclockwise in North Kyusu district [7]. From these, the tilting direction in the late Pleistocene is considered to be in the ENE direction.

(3) Discussed uncertainty of the extrapolation of uplift late from the land to the sea

In addition to the basic data set, we have created multiple possible data sets reflecting the uncertainty of the survey. These are saved data of some areas from the basic data set, and some data are replaced based on working hypotheses of terrace chronology. We constructed models from each data set and compare the average uplift rate distribution models of the late Pleistocene of coastal sea area. In this examination, the difference in uplift estimation due to the amount of data was larger than the difference of terrace chronology.

4. Summary and future tasks

Needless to say, the uplift model in the land depends on the data set of the uplift, and discussion on geological history is useful for verification of the model. Also, in this presentation, we showed how to evaluate the effect of uncertainty deriving from data set and models (working hypothesis). We would like to continue case studies.

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