Morphological analysis of terraces using digital elevation models for upgrade of terrace correlation method

Shinya Yamamoto[1]; Ryuta Hataya[1]; Takaomi Hamada[1]; Makoto Yanagida[2]; Masaru Satou[2]

[1] CRIEPI; [2] Hanshin consul. Co., Ltd

Uplift estimation in late Quaternary is required for site selection of geological disposal facility of high level radioactive waste. Generally the terrace level and/or the difference in elevation of terraces is a good indicator of uplift. Therefore, a reliable method of terrace correlation and chronology is a key issues.

Air-photograph interpretation is carried out in the early stage of a terrace investigation. Some terraces are classified chronologically by stratigraphy, terrace sequences, the erosion feature and so on. However, a terrace classification result often depends on the observer's qualitative interpretation. To improve the reliability and objectivity of morphological investigation with air-photograph interpretation, we examine to quantify the morphological properties of terrace surface by some variables which are computed by using Digital Elevation Models(DEMs).

In this study, we computed slope and laplacian by the morphological analysis, using data sets of terraces of which chronological data are clearly described, and obtained statistic value from these two variables within the terrace surface. In addition, two additional morphological variables were computed. One is the rate of remaining of the terrace surface, which is related to the degree of development of valley. The other is depth of the erosion calculated by summit level. The relationship between these morphological variables and terrace ages shows constant tendencies respond to the geomorphological process caused by the erosion. These results show that these morphological variables are capable of becoming quantitative index for the degree of terrace erosion, and contribute to upgrade of reliability of terrace classification by air-photograph interpretation.

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