

Investigation of tectonic geomorphology by statistics and computer applications

*Chigusa Yamazaki¹, *Naotoshi Tani², *Yusuke Sugimoto², *Wataru Oyama²

1. Attached Hiroshima University, Fukuyama junior and senior high school, 2. Kurashiki Amaki high school

In order to prevent disasters caused by the earthquake, it is necessary to know the position of the active faults and their activity cycle. The high resolution DEM with 10 m interval or 5 m interval can be used for detection of tectonic geomorphology due to past earthquakes. In this research, we aimed to assess the tectonic geomorphology from the high resolution DEM with the geographical slope gradient analysis function of GIS and the autocorrelation analysis of the statistics.

The tectonic geomorphology due to the active faults are considered that they construct the repetition of gentle slopes and steep ones. Therefore, the slope gradient of the topography is calculated from the DEM with the GIS applications. The target areas are set in the southern part of Okayama Prefecture, where the active faults are considered to be few, and the southern part of Hyogo Prefecture, where the active faults distribution are studied in depth.

In the south part of the Okayama prefecture, it was found that there were few tectonic landscape caused by the active faults. A distribution of the slope gradients greater than 10 degrees was analyzed using the 5 m DEM data around the southern part of Hyogo prefecture. A weak periodicity with about 125 m intervals in the correlation was observed in the North - South direction. A clear periodicity with about 100 m intervals in the correlation was observed in the East - West direction. In addition, as a result of two-dimensional autocorrelation analysis, a periodicity of the correlation was observed with about 80 m intervals. The periodicities of the intervals in the autocorrelation analysis of the distribution of the slope gradient in this area were suggested that there is a sudden topographic change every approximately 80 m in this area. If this topographical variation can be combined with the change due to the earthquake, the interval can be treated as the interval of the occurrence cycle of the earthquake in this area. This is a subject to be studied in the future.

Keywords: Tectonic geomorphology, DEM, GIS, Autocorrelation analysis, Active faults, Slope gradient