

GIS analysis of relationship between building damage, micro landscape, and surface geology

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It is known that there exists strong geographical relationship between the degree of earthquake damages and micro landforms. In Japan, land condition maps have been prepared by the Geographical Survey Institute (GSI) as a kind of basic thematic maps covering all the major urban area since 1960s. They clarify the natural conditions of the land by indicating the results of landform classification using aerial photo interpretation method.

The authors researched to clarify the geographical relationship between the variations of micro landforms and the degree of earthquake damages by combining the vector data of land condition maps and the information of earthquake damage distribution using GIS, especially case of the 1944 To-Nankai Earthquake in Tokai District. The recent publication of land condition maps in vector data format by GSI has enabled us to conduct the study combining various national land data using GIS.

Three big rivers, the Kiku River, the Ota River and the Tenryu River run in the Enshu-nada Region, and sand bank or sand bar exist along the coastline. In the Ota River basin, valley plain or flood plain distributes in upper stream, and coastal plain or delta distribute in lower stream. In the basin of Kiku River and other small rivers, valley plain or flood plain distribute widely. In the Tenryu River basin, fluvial fan and natural levee distribute in upper stream, and natural levee and valley plain or flood plain distribute in lower stream.

In this research, the authors overlaid the landform classification data of land condition map with distribution map of housing damages by the 1944 To-Nankai Earthquake (Ohba: 1957). On terrace or fluvial fan, housing damages are relatively small. And on valley plain or flood plain, coastal plain or delta and natural levee, housing damages are relatively large.

The authors are trying to analysis the relationship between housing damage and surface geology using boring core database in alluvial plain of Kiku River, Ohta River and Tenryu River. High building damage areas are located in the areas where low N-value mud sediments deposits thinly.