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Spatiotemporal analysis of land use, terrain, and geology in Fukuoka, Japan

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Since middle Holocene, humans are considered to be the most important geomorphic agent on relatively lower elevation area such as plains and foothills because the amount of earth moved is increasing exponentially due to intentional or unintentional land-cover change associated with agriculture, construction and mining activities etc.

In this research, a long-term land-use change in Fukuoka, Japan, as study area, has been analyzed spatiotemporally with 100m-mesh land-use data of 100 years, which were made from old 1/50,000 topographical maps in our previous study, and has been integrated into geologic and geomorphic characteristics using the geographic information system (GIS) to clarify regional interactions between human activities and geomorphic process.

The results are as follows.

(1) Land-use in Fukuoka, especially regarding area of colony and distribution tendency of farm land, changed significantly from 1950 to 1976 as compared to land use of 1900 harmonized with terrain.

(2) From 1900 to the present, the plains and foothills in which Quaternary and Tertiary sedimentary rocks are distributed have been being mainly used by humans, and the mountainous districts of Tertiary volcanic rocks and pre-Tertiary tend to be developed mostly as farm land. Meanwhile, pre-Tertiary plutonic rocks area had already been developed in various places before 1900, and the purpose of development changed from farm land to urban use after 1950.

(3) The relation between geology and slope angle in each land use implies that the terrain of Tertiary sedimentary rocks and pre-Tertiary plutonic rocks had been considerably influenced by human activities.

Keywords: human activities, land use, geomorphic process, regional geology, geographic information system