

## **GIS APPLICATIONS IN GEOMORPHOLOGY - A REVIEW**

OGUCHI, T.

Center for Spatial Information Science, The University of Tokyo

oguchi@csis.u-tokyo.ac.jp

Applications of Geographical Information Systems (GIS) to geomorphological research have been increasing since the 1990s with the propagation of “Desktop GIS”. Increasing availability of Digital Elevation Models (DEMs) at various resolutions has facilitated this trend. GIS and DEMs have enhanced the cartographic representation of landforms, which is not a mere description of topography but a useful support for building scientific hypotheses at an early stage of research. The more essential contribution of GIS and DEMs is their capability of quantitative analyses. Although such analyses often stem from methods of traditional geomorphometry, based on manual map measurements, they also reflect recent developments in related fields, such as vector GIS analyses and remote sensing. Major fields of GIS/DEM applications in Geomorphology include: 1) basic morphometric analyses mainly related to height, slope and curvature; 2) analysis of stream-nets and watersheds; 3) (semi-)automated landform classification; 4) soil erosion modeling; 5) landslide susceptibility modeling; and 6) detection and analysis of topographic changes. Although such applications have been developing in both quantity and quality, two problems are often observed. One is the lack of real conceptual or technological development. Some examples have simply applied established methods such as the USLE-type model for soil erosion and logistic regression for landslide susceptibility assessment. Such stereo-type studies contribute only marginally to scientific advancement, although they may provide important information to local planners and managers. The other problem is the weak geomorphological interpretation of results obtained from GIS analyses. This usually results from limited consideration of accumulated knowledge from conventional/traditional geomorphology. Greater collaboration between GIS/DEM specialists and other types of geomorphologists may help to solve this problem.