Development of Landform Classification Polygons using 250-m DEMs in the Asia-Pasific Region

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Classifications of topography using DEMs have been widely used for various purposes, for example, automatic searches of steep slopes and valley heads where landslide susceptibility is high, estimation of grain size or erosion resistance, and estimation of seismic amplification. However, most former studies used pixel-based approaches which could not handle increasing noise associated with enlarging the resolution of DEMs. Previously the corresponding author developed a pixel-based automated classification method of plains, terraces, hills, mountains and volcanos using slope gradient, texture and convexity calculated from a DEM (Iwahashi, 1994), then produced 1-km grid landform classification data using SRTM30 (Iwahashi and Pike, 2007). In this study, the authors developed the Iwahashi and Pike (2007) method and produced landform classification polygons of East Asia, Southeast Asia, and the western part of North America using an interpolated 250-m DEM of GMTED2010.

Classifications of raster images such as DEMs are typically done by thresholding, regression, or data mining using geometric signatures. In this study, the authors made the polygons of homogeneous geographic areas by multiresolution segmentation (Baatz and Schäpe, 2000) before classification. We used the three geometric signatures which were used in Iwahashi and Pike (2007). In the case of the polygon-based method, the variation range of usable classification techniques is wider than a pixel-based case, because of a large decrease in the quantity of data. There are many options for the polygon-based method; for example, in choice of geometric signatures, tuning of geometric signatures, scale parameter for segmentation, method of classification, and tuning of classification. In this presentation, we introduce trials and considerations in the Asia-Pacific region.

The results in this presentation show good performance in extracting meadows and classification of intermediate landforms such as terraces, fans and hills in the regions of steeper and various landforms in orogenic zones such as Japan or the western coast of North America. On the other hand, the results do not show enough performance in extracting small landforms for very flat and simple plains such as deltas in a continental region. Mountains may be classified as rock mass classification; however, regional climate differences should be taken into account from differences of erosion styles in volcanos between mid-latitude zones and tropical zones.

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