

Applying digital stereoscopic topographic maps to geomorphological and geological interpretation

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Thematic topographic maps have developed by the progress in analysis using digital elevation model (DEM) and have made clear representation possible. Such situation is supported by the supply of 250 m, 50 m and 10 m mesh DEM arranged by Geospatial Information Authority of Japan (GSI) and higher resolution 5 m, 2m and 0.5 m mesh DEM gained by laser profiler (LP) by private aerial survey companies. DEM-based analyses for topographic representation are various and product contour colored contour map, shaded map, relief map and their 3D map. Our digital stereoscopic topographic map (DSTM) is mainly composed of slope map and openness map, and they are three dimensionally represented by anaglyph image according to the analytical and display method by Yokoyama et al. (2012). These are characterized as follows.

(1) Digital stereoscopic slope map directly shows reliefs and geologic structures. Scarps, such as terrace scarps and fault scarps, are distinguished using high resolution DEM. Thus, we can classify topographic units and fault interpretation, putting results on maps and discussing or crosschecking results on screens by plural persons.

(2) Surfaces controlled by lithology and geologic structures are reflected by slopes more than reliefs. We can easily interpret structural topography among large scale geologic structure, just as if we view it in non-vegetated arid region.

(3) Digital stereoscopic openness map emphasizing valley and ridge lines clearly shows displacement reference topography, especially strike-slip fault topography compared to ordinal toposheets. High resolution LP-based openness map help us to interpret strike-slip offset streams. Besides, the openness map is effective to identify dissection, drainage pattern and catchments in hilly lands.

Keywords: Digital elevation model, Digital stereoscopic topographic map, Digital stereoscopic slope map, Digital stereoscopic openness map, Interpretation of geomorphology and geology