Abstract

The Blue Nile basin has diverse geological history, eg. repeated sea transgression and regression, Tertiary and Quaternary vulcanism, extensional faults in rift system, or area uplift (in the last 29 million years), which caused cutting of the rivers to their subsoil and creating deep gorges (Kazmin, 1975; Pik et al., 2003; Beyne, Abdelsalam, 2005, 2006; Gani et al., 2007; Gani et al., 2009; Wolela, 2010).

This paper deals with classification and morphometric features of the Blue Nile valley nets in the Ethiopian highlands.

Dendritic and trellis valley nets predominated in the Blue Nile basin. Trellis and rectangular valley nets predominated in the eastern part of the studied area, i.e. the upper part of the drainage area, and dendritic valley nets predominated in the western part of the studied area, i.e. the lower part of the drainage area. Parallel valley nets were located on the border of the studied area, i.e. the watershed or on the slopes of Cenozoic shield volcanoes. Annular valley nets did not occur in the Blue Nile basin.

Valley nets were characterized by specific topologic and geometric features: 1) the Gravelius order system; 2) the bifurcation ratio of various order valleys, 3) the average length of various order valleys, 4) the average length-order ratio of various order valleys, 5) the fractal dimension of various order valleys, 6) the total length of various order valleys, 7) the total length-order ratio of various order valleys, 8) the relative fractal dimension of various order valleys, 9) the angle between the valleys, 10) the valley nets' density, and 11) the homogeneity of various order valleys.

The morphometric analysis (based on comparison of morphometric features) of valley nets in the Blue Nile basin differentiated the trellis and rectangular valley nets from the parallel and radial valley nets.

Key words: valley nets, morphometry, Blue Nile, Ethiopean highlands