

Directional analysis of drainage network and morphotectonic features in the south-eastern part of Bükk Region

PÉTER PECSMÁNY¹, ANDRÁS HEGEDŰS¹, JÁNOS VÁGÓ¹ and NORBERT NÉMETH²

Abstract

The fracture deformations often result in linear morphological elements (lineaments, valleys) on the surface. In many cases, the direction of the lineaments and valleys can be well followed by the strike of the geological structural elements. Therefore, conclusions can be drawn from these directions for regional tectonic processes. Our work aimed to analyse the relationship between the valley and lineament network and the structural elements in the south-eastern part of Bükk Region. We prepared the theoretical drainage network map and lineament map of the area. The direction of the linear elements was examined separately on the eastern part of South-Eastern Bükk that is built up mainly by Mesozoic limestone and the eastern side of Bükkalja area covered by Neogene and Quaternary sediments. Structural geological surveys were also performed on seven sites to measure the strike of joint sets. These results were compared with the valleys' direction in the 2 km wide area of the measurement sites. Based on our results, it can be stated that the development of the drainage network was influenced by the geological elements; however, there are local differences in the characteristics of the South-Eastern Bükk and Bükkalja. Our study confirmed that the study of linear morphological elements has great importance in the exploration of geological structural elements.

Keywords: drainage, lineament, directional analysis, structurally controlled streams, tectonic preformation, morphotectonics, Bükk Mountains, Bükkalja

Received: April 2021, accepted June 2021

Introduction

On the surface, faults often cause linear geomorphological structures called lineaments (TWISS, R.J. and MOORES, E.M. 1992; JORDÁN, Gy. and CSILLAG, G. 2003; RADAIDEH, O.M.A. *et al.* 2016). In the dissected zones weakened by faults, the erosion is more effective, therefore valleys often form along with these structural elements (MARTZ, L.W. and GARBRECHT, J. 1992). Besides the valleys, lineaments can be geomorphological units like ridges, escarpments (TWISS, R.J. and MOORES, E.M. 1992; JORDÁN, Gy. and CSILLAG, G. 2003; RADAIDEH, O.M.A. *et al.* 2016). Measuring and analysing the direction of lineament and drainage

network is important, because we can infer the directions of the main strike of geological structural elements (TWISS, R.J. and MOORES, E.M. 1992; EYLES, N. *et al.* 1997). Mapping lineament and drainage network is relevant both in geomorphological and structural geological research because these are in association with the regional structural processes (RAMSAY, J.G. and HUBER, M.I. 1985; TWISS, R.J. and MOORES, E.M. 1992; CENTAMORE, E. *et al.* 1996; EYLES, N. *et al.* 1997; JORDÁN, Gy. and CSILLAG, G. 2003; DOMBRÁDI, E. *et al.* 2007; RUSZKICZAY-RÜDIGER, Zs. *et al.* 2007, 2009; RADAIDEH, O.M.A. *et al.* 2016; GIOIA, D. *et al.* 2018).

The structural evolution of the south-eastern part of Bükk Region was directed by varied ge-

¹Institute of Geography and Geoinformatics, University of Miskolc, H-3515 Miskolc, Miskolc-Egyetemváros. E-mails: ecopeter@uni-miskolc.hu, ecoeged@uni-miskolc.hu, ecovago@uni-miskolc.hu

²Department of Geology and Mineral Deposits, University of Miskolc, H-3515 Miskolc, Miskolc-Egyetemváros. E-mail: foldnn@uni-miskolc.hu