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The role of neotectonics in the formation of Rosomačka River flow – Stara Planina, Serbia

Ролята на неотектониката при оттока на река Росомачка – Стара планина, Сърбия

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Introduction

Located on the slopes of Stara Planina Mountain in Serbia, the catchment area of Rosomačka River is characterized by attractive geological, geomorphological and hydrogeological phenomena. This study analyzes the influence of catchment area geological elements on Rosomačka River flow formation. Due to large oscillations of its flow during the year (from powerful torrential to drying), Rosomačka River belongs to the category of hydrological complex watercourses. It can be considered as a hydrologically unexplored watercourse with negligible influence of anthropogenic activities. For the purpose of this study, multidisciplinary study of the Rosomačka River catchment area was performed in 2016.

Materials and methods

The data from published materials and public data sources were combined with field research activities. These field research activities have primarily included the reconnaissance survey of Rosomačka River catchment basin. Where necessary, detailed geological and hydrogeological mapping was performed. For the analysis of study area rupture characteristics, remote sensing was applied. The photogeological analysis provided the basis for the visual detection of geological structures within the study area. For the analysis of neotectonic activity, the quantitative geomorphological analysis – the energy of relief method was used.

Results and discussion

Based on the overall analysis, it can be concluded that Rosomačka River catchment area extends within three neotectonic blocks: Block 1 – Tupanac, Block 2 – Igin Vrtop, and Block 4 – Rudine (Fig. 1). These blocks are separated by neotectonicaly active zones, along which their relative movement had occurred. Mentioned regional neotectonic active zones extend in the SW-NE direction and divide the Rosomačka River catchment area on the relatively elevated (Block 1), and relatively lowered terrain parts (Block 2 and Block 4). The Block 1 and Block 2 are characterized by the absence of significant hydrogeological porosity. Due to the limited subsurface infiltration, Rosomačka River has a constant flow during the entire year in this area. Moreover, the intensive precipitation events and snow melting cause its transformation to powerful torrential stream. As the consequence of its significant kinetic energy, Rosomačka River has formed short gorge Reka within Block 2. The middle part of this watercourse extends from the mentioned gorge Reka to the gorge Rosomačko Grlo. The river flow regime within Block 2 is very complex. During the recession period, the river completely dries up upstream from the village of Rosomač, while downstream it has a constant flow. Moreover, in the upstream part, the fluvial accumulation has formed the alluvial plain, while downstream the gorge Rosomačko Grlo has been formed. This shift from fluvial accumulation to the erosion is caused by the local neotectonic activity within Block 2. Thus, the relative rise of the SubBlock 2a – Padež had created narrow neotectonic depression, which had been filled with fluvial material. This alluvial plain has been mainly formed beneath karstified Triassic limestones and dolomites, causing sinking and complete dry up of Rosomačka River in this zone (Nikić, 2003). Downstream from the village of Rosomač, the terrain is made of Jurassic formations characterized by the local fissured aquifers with limited discharge. During the recession period, groundwater from these aquifers

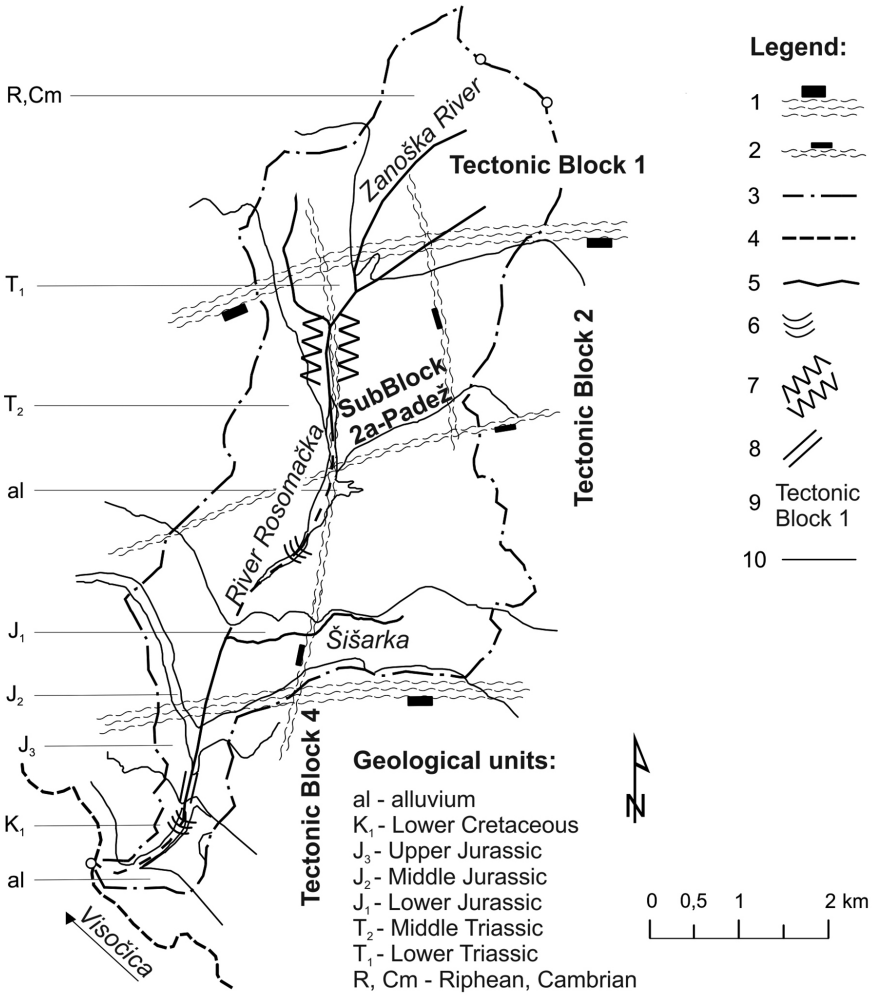

Fig. 1. Simplified geological and neotectonic scheme of the Rosomačka River catchment area (adapted from Anđelković et al., 1977): *1*, regional neotectonic active zone; *2*, local neotectonic active zone; *3*, topographic watershed; *4*, non-perennial watercourse; *5*, perennial watercourse; *6*, sinking zones; *7*, short gorge; *8*, gorge; *9*, neotectonic block; *10*, geological boundary

contributes to the constant flow of Rosomačka River in this area.

Overall, the study provides clear insight into the influence of neotectonic, lithological, hydrogeological and morphological elements on the formation of Rosomačka River flow.

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