NEW PETROLOGICAL EVIDENCE FOR INTERACTION BETWEEN MAGMATIC AND DEPOSITIONAL PROCESSES IN THE TIMOK MAGMATIC COMPLEX (TMC) BASIN

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INTRODUCTION

The Timok magmatic complex (TMC) is Serbian segment of the Late Cretaceous Apuseni-Banat-Timok-Srednogorie magmatic belt, which was formed due to subduction of the Neotethys oceanic lithosphere beneath the Carpatho-Balkanides of south-eastern Europe. The back-arc basin hosting the TMC and associated sedimentary sequences was formed on the Getic tectonic unit of the Dacia mega-unit with European continental affinity. The interplay of sedimentary and magmatic processes in the TMC basin is still not fully understood. The aim of this study is to provide new insights into the coupled magmatism and sedimentation during the evolution of the TMC.

RESULTS AND DISCUSSION

The volcanics of the TMC are exposing different ages across the basin, which is the effect of the roll-back of the subducted slab, whereas the progressive volcanic front migration was recorded from the east to the west, ranging from 90 Ma to 80 Ma (Kolb et al., 2013). Three different varieties of TMC volcanics are distinguished: andesites, latite dykes, and monzodiorite subvolcanic intrusions. On the other side, sedimentary rocks are represented by two formations; (1) volcano-sedimentary epiclastites defined as Metovnica formation (Đorđević & Banješević, 1997) and (2) typical sedimentary derived products, marlstones and sandstones, defined as Oštrelj formation (Ljubović-Obradović, 2008). Oštrelj formation is along its overall extension underlain by epiclastites of Metovnica (Banješević et al., 2019). The former is attributed to the marine environment and depths of a few tens of meters, while the latter is dominantly built by andesite-derived material, which itself originates from different volcanic phases and facies and was included in the sedimentary cycle, i.e., weathering, transport, deposition, and diagenesis in marine or continental environment. Depending on the depositional regime, the speed of sea or ocean advancing, and the supply of volcanic-sedimentary material into the basin, these two entities in the transitional area are commonly intertwined.

At the open profile along the road between Slatina and Rgotina villages, on the southeastern peripheral part of the TMC (Fig. 1), the marine sediments of Oštrelj overlie the Metovnica epiclastics. The apparent mingling of these two units indicates the transitional environment, i.e., a shore-related environment of an advancing basin.

Figure 1: Open profile of the transitional zone along the road between Slatina and Rgotina villages.

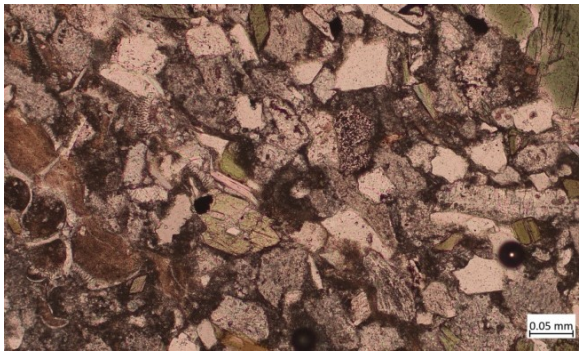

Figure 2: Photomicrograph of the sandstone sample from transitional zone: terrigenous clasts mixed with fossil remains of globotruncana.

Transitional features and interlocking of Metovnica and Oštrelj formation are confirmed by thin sections (Fig. 2). The sample of sandstone (arkose) with carbonate cement, comprises plagioclase, amphibole, biotite, seldom quartz, andesite fragments and fossil detritus of rare recrystallized benthic foraminifera, micritized echinoid spines, ostracod fragments, and fragmented planktonic foraminifera, possibly of the genus *Globotruncana*, which is indicative for Oštrelj formation. As the Metovnica unit is composed dominantly of andesite-derived material, and Oštrelj considers typical marine sediments, hence the sandstone sample indicates a transitional setting, i.e., a shallow sedimentation area approaching landward.

Along coastal slopes particles of volcanic origin (Metovnica) deposited as slowly or rapidly eroded fragments, accumulate in the basin and in various proportions mix with sedimentary particles of the Oštrelj unit (Fig. 3). According to Walther's Law of Correlation of Facies (1894), the conformably overlying of Oštrelj and Metovnica formations in outcrops indicates their synchronous formation in adjacent environments. In addition, their vertical stacking reflects lateral changes in the environment such as marine transgressions and regressions.

The study of products within transitional environments arguably leads to better understanding of magmatic history and basin evolution in the given area.

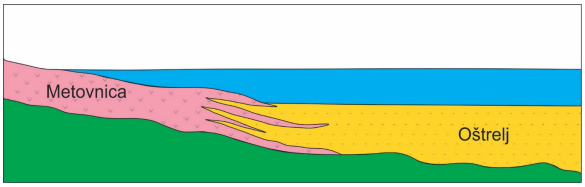

Figure 3: Schematic representation of propagation of volcanic-derived material (Metovnica) into the basin (Oštrelj) and transitional area with interlocking volcanic and non-volcanic stratigraphies.

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