

Mineralogical and Geochemical Characteristics and Provenance of Upper Miocene Sediments in the South-western Part of the Pannonian Basin

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Upper Miocene sediments of the south-western part of the Pannonian Basin have been investigated in the region of Hrvatsko Zagorje, Mt. Medvednica and Mt. Žumberak (Fig. 1). They consist of various siliciclastic and carbonate rocks that are grouped into six informal lithostratigraphic units: Croatica, Medvedski Breg, Ozalj, Andraševac, Hum Zabočki and Pluska (KOVAČIĆ & GRIZELJ 2006).

The Croatica unit consists of thin-bedded clayey limestones and marls with rare intervals of massive marls and sands. The Medvedski Breg unit consists mainly of massive marls with rare occurrences of sand-gravel deposits. Middle- to coarse-grained clastic sediments are typical for the Ozalj unit. An alternation of sand beds, silts and silty marls is characteristic of the Andraševac unit, while the Hum Zabočki unit consists of an alternation of sand beds and silts. The Pluska unit, the youngest unit, which has been doubtfully referred to the Miocene, consists of clay, silt and sands with layers and lenses of gravel and coal.

Mineralogical and chemical composition of the detritus indicates clearly its origin from two different source areas.

The clastic detritus of the older units (Croatica, Ozalj and Medvedski Breg) is immature, originating from intense mechanical weathering of the hinterland and islands. Their composition varies greatly and reflects clearly the composition of the source rocks.

Pelitic sediments of Medvedski Breg and Andraševac units are classified as marls or silty marls. They are composed dominantly of calcite and clay minerals, while quartz and feldspars are less abundant. Among clay minerals, in the $<2\mu\text{m}$ insoluble residue fraction, smectite, illite, chlorite and kaolinite were determined GRIZELJ et al. (in press). Observed gradual decrease in carbonate content, and simultaneous increase of clayey-silty component, going from Medvedski Breg to Andraševac unit, is the result of the gradual increase of terrigenous influence.

Younger units (Andraševac, Hum Zabočki and Pluska) are composed of mineralogically and texturally relatively mature sandy and silty detritus.

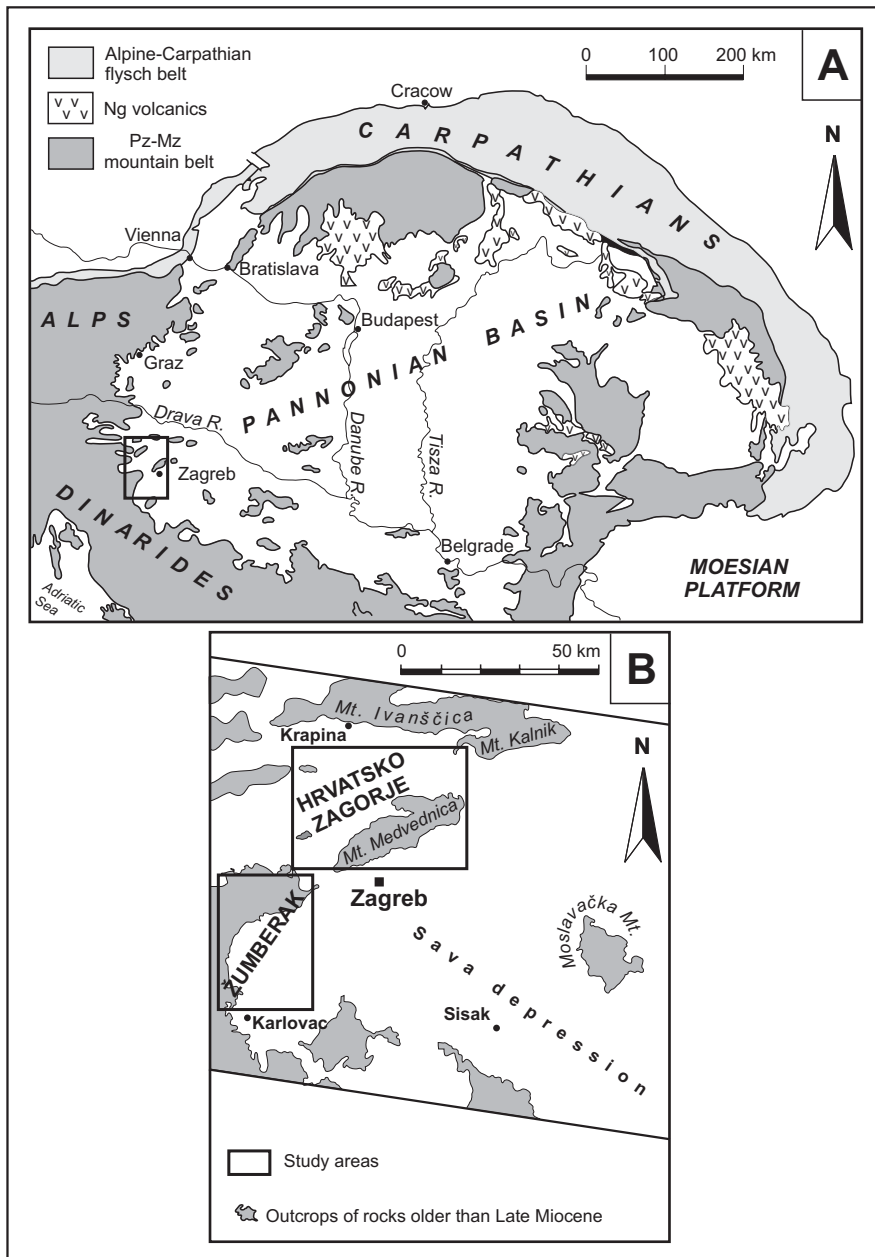


Fig 1: A) Sketch of the Pannonian Basin and its surroundings. B) Location of the study areas.

The detritus has a uniform composition in the entire study area. It derived from weathering of various sources, mainly siliciclastic sediments and metamorphic rocks, and to a lesser degree, basic and ultrabasic magmatic rocks (KOVAČIĆ & GRIZELJ 2006). The composition of the main detrital modes of the arenites, palaeotransport measurements and mineralogical and chemical composition of pelitic sediments suggest their provenance from an orogenic belt located to the NW, W and NE of the studied area, i. e., the Eastern Alps and Carpathians (Fig. 2).

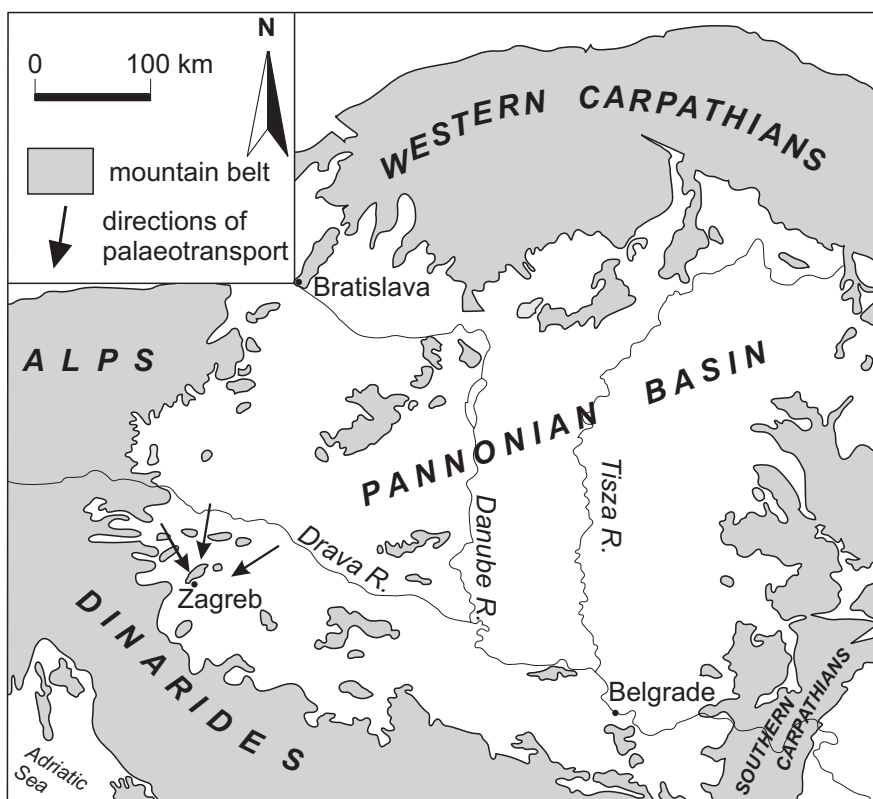


Fig. 2: Dominant directions of progradation of Upper Miocene clastic detritus of the Andraševac and Hum Zabočki units in the SW Pannonian Basin (modified after KOVAČIĆ & GRIZELJ 2006).

A gradual change of the heavy mineral assemblage was observed at the contact between Upper Miocene and Pliocene deposits. This change could be linked to the structural changes in the Alpine-Carpathian orogene when rocks from deeper parts were brought to the surface, or to the rearrangement of source areas within the orogene area.

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References

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