

DETRITAL ZIRCON GEOCHRONOLOGY ON THE LOWER DANUBE: IMPLICATIONS FOR SEDIMENTARY SOURCE

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ABSTRACT

The U-Pb geochronology on detrital zircons (DZ) from the Lower Danube River and from seven major left Romanian tributaries indicate three major populations ages: i) Cambrian-Ordovician, associated to back-arc basins and island arcs, linked to the Peri-Gondwana subduction (600 – 440 Ma); ii) Lower to Middle Carboniferous, from magmatic and metamorphic Variscan units (350 – 320 Ma), represented by dominant peaks in most analyzed samples; iii) Upper Cretaceous to Tertiary, younger than 100 Ma, possibly related to the Southern Carpathian Late Cretaceous Banatitic arc and to the Neogene volcanism of the Eastern Carpathians and Apuseni Mountains.

In the case of the Lower Danube western tributaries Cerna, Topolnița and Jiu, our results show that the main source of the DZ are the metamorphic rocks characteristic for the Upper and Lower Danubian tectonic units of the Southern Carpathians (ca. 300 Ma). These units are identified as components of Dacia mega-unit and consist of high-grade metamorphic rocks. Weak signals of Variscan events (340-325 Ma) were identified by several recent publications, while in the present study the investigated samples show stronger indication of a regional Variscan metamorphism.

Some larger tributaries in the eastern (downstream) Lower Danube, such as Olt, Argeș, Ialomița and Siret rivers show temporal disperse peaks on the DZ geochronology, feature probably reflecting successive processes of recycling. Notably, the most representative sources of DZ identified in the samples from easternmost Lower Danube tributaries (Siret and Prut rivers) are the Variscan metamorphites.

The analysis performed on both western samples (Cerna, Topolnița, Jiu and Olt rivers) and easternmost sample from the Danube sediments show a strong Variscan peaks that could be principally correlated with the former Ceahlău-Severin oceanic basin. Nonetheless, most of the sampled tributaries discharge high loads of terrigenous material from the Southern and Eastern Carpathians, especially Olt, Argeș, Ialomița and Siret rivers show temporal disperse peaks on the DZ geochronology, feature probably reflecting successive processes of recycling. Finally, the sample from the Danube Delta Front (nearby Isaccea locality) yielded a wide DZ distribution, mirroring the huge amount of sedimentary material from various sources.