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# The meta-detrital zircons put an upper boundary for the age of the Romanian Carpathian pre-Alpine crystalline: a new group of North-Gondwanan Paleozoic terranes

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Six metaterigenous lithons intercalated in five metamorphic sequences from Romanian Carpathians have been sampled for detrital zircons. These are Negrisoara in Eastern Carpathians, Fagaras and Lescovita in Southern Carpathians, Somes and Paiuseni in Apuseni Mountains. Early Ordovician zircon U/Pb ages have been obtained from orthogneisses considered to be protoliths of Negrisoara and Somes sequences. Some Permian zircon U/Pb ages on granites intruding the Paiuseni sequence have been reported. Fagaras and Lescovita sequences were dated by any means until now.

A number of at least one hundred zircon grains per sample have been ablated using LA-ICP-MS instruments at the isotope geochronology facilities of The University of Arizona, excepting two samples of 52 grains each dated at China's University of Geosciences in Wuhan, China. Our purpose was to get provenance constraints and to put an upper boundary to the formation age of metasediments.

The achieved detrital zircon age models are highly consistent with the known models for the East Mediterranean region. The majority of zircons gave Late Proterozoic ages. Very important, there are many ages between 0.95-1.15 Ga and also notable clusters appear between 1.8-2.2 and 2.5-2.75 Ga. For the Late Proterozoic age distribution,

two peaks appear prominent, one characteristic for the Pan African Orogeny (550-800 Ma) and a second one indicating an Arabian-Nubian affinity (800-950 Ma). The peak representing the 950-1150 Ma span is very probably related with the Kibaran Orogeny or reflects some Arabian-Nubian links, this interval being well expressed in the Elat sandstones (Israel). The 1.8-2.2 Ga interval corresponds to the Eburnean Orogeny and the 2.5-2.75 Ga one suggests a Saharan provenance. A small number of Mesoproterosoic grains (>1.2 Ga) probably had the same source. The minimum age exhibited by each detrital population is Cambrian. Thus we can conclude that excepting the Danubian domain of Southern Carpathians, the rest of the pre-Alpine Carpathian crystalline is essentially Early Ordovician in age. Such ages has been reported for several metamorphic sequences in Eastern and Southern Carpathians and the Apuseni Mountains. Because both in the Eastern and Southern Carpathians and also in the Apuseni Mountains have been documented Variscan sutures, at least six Paleozoic terranes are identified as building up the Carpathian basements (except for the Danubian domain). These Carpathian Paleozoic terranes can be described as a special class of peri-Gondwanan terranes with specific features: 1) they have Early Ordovician protolith ages; 2) their birth place is somewhere between Tunis and Egypt at the north-eastern border of Gondwanaland; 3) their primitive material represent an old reworked crust. They are considerably different from Avalonian, Cadomian and Minoan terranes, first of all because all these three terranes groups possess Neoproterozoic protoliths. Our conclusions are at odd with some recent hypotheses according with the Eastern and Southern Carpathians terranes can have an Avalonian affinity. Also some of them could possibly represent fragments of larger terranes split up during Variscan and Alpine orogenies. Finally we suggest that one of the larger Carpathian terrane was probably part of the Northern Gondwana inclusively during the Variscan Orogeny.