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Alternatives for the source of the exotic green clasts from Moldavian Nappes (East Carpathians, Romania)

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Important segment of the Carpathian chain, the East Carpathians consists of several tectonic units build up during the Mesozoic and Cenozoic closure of the Tethyan Ocean. These tectonic units are composed by crystalline basements and sedimentary covers, or only by sedimentary piles and they represent a result of two compressional phases of Alpine orogenesis: one during Late Cretaceous that was responsible for thrusting of Central East Carpathian Nappes and Outher Dacian Nappes, and a second phase during Early and Middle Miocene interval that involved the Moldavian Nappes as the external nappes (Sandulescu, 1988). The Moldavian Nappes consist of cover nappes tectonically detached from the basement upon which it was deposited. From inside towards outside several units occur: Convolute Flysch Nappe, Macla Nappe, Audia Nappe, Tarcau Nappe, Marginal Folds Nappe and Subcarpathian Nappe (Sãndulescu et al., 1981). If the internal units (up to Audia Nappe) are represented by the Cretaceous sediment piles, in the external units, especially in the Tarcau Nappe and also in the Marginal Folds Nappe the lithology is dominated by the Paleogene deposits, especially by the Oligocene formations. The most particular for these units are the presence of heterogeneous composition induced by the wildflysch type sedimentation. Previous researchers have considered the piles of the both units as flyschoid deposits, and for a minor central part (Slon Facies) they accepted a wildflysch scenario. Based on our field studies between Prahova valley (Romania) and Tisa upper stream basin (Ukraine), the different sedimentary strata (the Oligocene Tarcau, Fusaru, Kliwa sandstones, dysodilic and menilitic rocks, polymictic conglomerates, marls and argillaceous deposits together with Upper Cretaceous polymictic conglomerates and green-reddish argillaceous deposits) are tectonically mixed during the late-Oligocene – Middle Miocene events. The mechanism of sedimentary mélange is supposed to be related to submarine landslide initiated by huge earthquake activity. In this way the velocity of landslide sedimentation was high and as result the spatial distribution of different rock types is inhomogeneous. On the other hand, high velocity of syn-sedimentary deformation generates synchronous shear zones. The stress field in this environment is influenced by the lithological amalgamation and local discontinuities. After sedimentary deposition and syn – deformation processes in all the area, suborizontal shear zones (SSZ) are formed along the borders of sandstone olistoliths embedded in fine-grained sand-argillaceous sediments; they are related to the Miocene tectogenesis. Taking into account that are not lithological differences in the Tarcau and the Marginal Folds units, the contact between them as all major SSZ represent the intra-formational thrusts (Sandulescu, 1984). An important characteristic of the Moldavian Nappes is the presence of the exotic rocks as clasts in conglomerates that are very different in nature (igneous, metamorphic and sedimentary), volume and size and generally green in colour. Many authors who studied this lithological aspect have suggested that a Cumanian ridge was their source. The ridge was active since Upper Creataceous till Miocene widespread from Central Dobrogea to Poland and mainly composed by “dobrogean green schist” rocks. This ridge was placed between Audia and Macla sedimentation areas, or between Audia and Tarcau sedimentation areas. According to our studies, the green clasts from various conglomerates with igneous (intrusive and extrusive aspects), metamorphic (medium to low grade) and sedimentary nature present a variable participation. The green clasts are apparently similar with the central dobrogean green schist rocks and are less than 10% in participation in all Moldavian units. For this reason we suggest that the Central Dobrogean domain wasn’t the source area for the discussed clasts. After Oszczypko (2006), in the Polish Carpathians, between the Magura and Silesian basins during the Upper Cretaceous – Miocene interval the Silesian Ridge was active. Probably, the same structure was active from Polish Carpathians to the south-western end of Romanian East Carpathians also responsible for the presence of the exotic pebbles from external units of East Carpathians. Isotopic ages of exotic clasts from Polish Carpathian Flysch display the values

characteristics for the late Neoproterozoic-Cambrian and the late Carboniferous – Permian intervals (Poprawa et al., 2004) which may suggests that the active ridge was a part of the Tornquist – Teisseyre Zone exhumation.

Refernces

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