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# Paleogeography of the Outer Carpathian Carbonate Platforms in Poland

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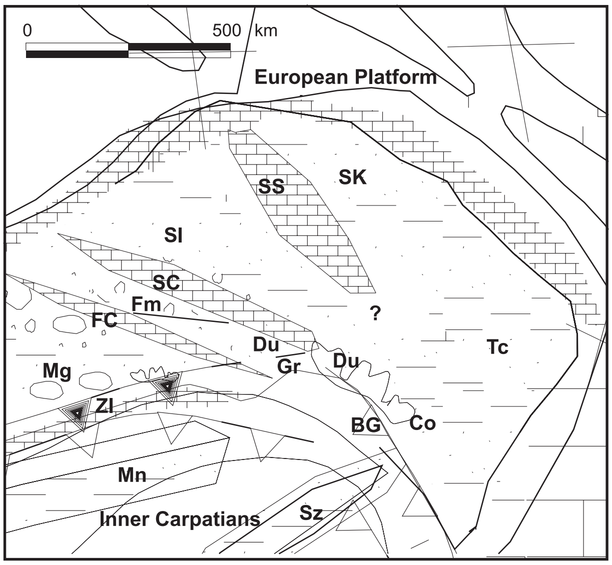
The Northern Carpathians are subdivided into an older range known as the Inner Carpathians and the younger ones, known as the Outer or Flysch Carpathians. At the boundary of these two ranges the Pieniny Klippen Belt is situated. The Outer Carpathians are built up of a stack of nappes and thrust-sheets changing along the Carpathians built mainly of flysch. All the Outer Carpathians nappes are overthrusting onto the European platform covered by Miocene deposits of the Carpathian Foredeep. These nappes have mainly allochtonous character, and originated in basins situated outside their present location. On the other hand, traditionally (e.g. Pescatore and Ślączka 1984) the following sedimentary basins have been distinguished within Northern Outer Carpathians from south to north: the Magura Basin, the Dukla and Fore-Magura set of basins, the Silesian Basin, the Sub-Silesian Ridge and the Skole Basin.

The Mesozoic and Cenozoic paleogeography of the Outer Carpathians reflects the series of continental break-ups, rifts and collisions (Golonka et al. 2000, 2003, Golonka 2004). The Magura Basin originated as part of the Penninic-Pieniny Klippen created during Mesozoic time between Tethyan terranes and Eurasia. The other Outer Carpathian basins had developed in the process of rifting and fragmentation of the European platform. During the Cretaceous tectonic reorganization the new Outer Carpathian realm was formed. Within this realm in the foreland of the folded Inner Carpathians area, several basins divided by ridges and underwater swells became distinctly separated.

The orogenic processes in the Northern Outer Carpathians produced an enormous amount of the clastic material that started to fill the basins. The material was derived from the northern and southern margins as well as from the inner ridges and swells. Each basin had the specific type of clastic deposits, and sedimentation commenced in different time.

In Paleogene the movement of Adria and Alcapa terranes resulted in gradually closing of the flysch basins and development of an accretionary prism. The ridges dividing the flysch basins in Outer Carpathians became more distinguished providing favorable conditions for development of shallow banks with the carbonate platform sedimentation. These platforms have been destroyed during the orogenic process. The platform deposits formed numerous carbonate fragments that have been found in the Outer Carpathians flysch and olistostromes. These fragments were transported with the turbidity currents to the flysch, forming the organodetritic limestones and sandstones. Their distribution provides significant help in an attempt to find the original location of carbonate platforms and finally, to make proper palinspastic reconstruction of the Northern Outer Carpathian realm.

During the final orogenic stage Africa converged with Eurasia. The direct collision of the supercontinents never happened,




■ **Fig. 1.** Paleogeography of the Outer Carpathian basins during Paleocene and distribution of carbonate platforms. BG – Bucovinian-Getic, Co – Cornohora, Porkulec, Audia, Teleajen, Cr – Czorsztyn ridge, Du – Dukla, FC – Fore-Magura ridge (cordillera), Fm – Fore-Magura basin, Gr – Grybów, Mg – Magura, Mn – Manin, Si – Silesian basin, SK – Skole, SC – Silesian Cordillera, SS – Sub-Silesian ridge, Sz – Szolniok, Tc – Taracau, Zl – Zlatna.

but their convergence lead to the collision of intervening terranes leading to the formation of the Alpine-Carpathian orogenic system. Through the Miocene tectonic movements caused final folding of the basins fill and created several imbricate nappes which generally reflect the basin margin configurations after the Cretaceous reorganization and Paleogene development of the carpathian accretionary prosm (Oszczypko et al 2003 ). The Sub-Silesian ridge deposits were partially included into the Su-Silesian nappe, the ridge's basement rocks and part of its depositional form olistostromes and exotic pebbles within Menilitic-Krosno flysch. The largest olistostromes were found in the vicinity of Andrychów and are known as Andrychów Klippes (see remarks above about Andrychów ridge). The Fore-Magura and Silesian ridges were destroyed totally and are known only from olistolites and exotic pebbles in the Outer Carpathian flysch. They destruction is related to the advance of the accretionary prism (Oszczypko et al 2003, Golonka et al 2004 ). This prism obliquely overridden the ridges leading to the origin of the Menilitic-Krosno basin. The Malcov Formation was deposited in the smaller piggy-back subbasin. During overthrusting the outer, marginal part of the advanced nappes was uplifted whereas in the inner part sedimentation persisted in the remnant basin. From that, uplifted part of the nappes big olistolites glided down into the adjacent, more distal basins. The nappes became detached from the basement and were thrust northward in the west and eastward onto the North European platform with its Miocene cover. Overthrusting movements migrated along the Carpathians from the west towards the east. The Outer Carpathian allochtonous rocks, as result of Miocene tectonic movements, have been overthrust onto the platform for a distance of 50 to more than 100 km.

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# Mesozoic Plate Tectonics of the Inner Carpathians – Rotational Approach

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The paleomagnetic suggest significant couterclockwise rotations of the Inner Carpathian terrane during the Miocene (Márton et al. 1996, 1999, 2000). Palinspastic reconstructions require to take this movemant into serious consideration and move the terrane back to its original position. The pre-Neogene position after clockwise rotation from the present day location will significantly