

The Early Miocene residual Magura flysch basin at the front of the Central Carpathians and its paleogeographic implications (Magura Nappe, Poland)

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There is a common understanding that the closing of the Outer Carpathian basin took place gradually in accordance with traditional Alpine model from internides to externides, i.e. from the south to the north (Książkiewicz, 1977; Birkenmajer, 1986, 1988; Oszczytko, 1992, 2006; Golonka et al., 2000). However, the discovery of the Oligo/Miocene sediments of the Magura Nappe near Stara Lubowna (Oszczytko-Clowes et al., 2005) and near Szczawnica, at the front of the Pieniny Klippen Belt (PKB) (Oszczytko & Oszczytko-Clowes, 2010, 2014) requires a revision of existing views.

In 1992 Cieszkowski described the Middle Miocene deposits of the Magura Succession in the Stare Bystre and Rogoźnik sections (Podhale region). Simultaneously more or less the same deposits were drilled in the Nowy Targ PIG-1 borehole (Paul & Poprawa, 1992), at the northern boundary of the PKB. All of these strata revealed multiple layers of reworked foraminifera and calcareous nannoplankton from the Cretaceous and Palaeogene ages (see Oszczytko-Clowes, 2012).

Similar results were achieved near Stara Ľubovňa (East Slovakia). In this area within the contact zone of the Magura Nappe and the Pieniny Klippen Belt, Stranik and Hanzlikova (1968) described the "Kremna facies" (Paleocene to Early Eocene previously known as the "Nordliche Granz Flysch Zone" (Uhlig, 1898). These deposits were redefined as the Kremna Fm. of the Early Miocene age (Oszczytko et al., 2005). The calcareous nannoplankton studies of this formation showed a predominance (60%) of reworked species, mainly of Middle-Late Eocene age, while the youngest species that were identified belonged to Early Miocene (NN1 and NN2 zones, see also Oszczytko-Clowes, 2012). During recent years the Kremna Formation was recognized also in the Krynica facies zone in the Muszyna and Jaworki areas (Oszczytko & Oszczytko-Clowes, 2010, 2014) as well as also in the "Magura Autochthonous Paleogene" in the tectonic windows of the PKB (Oszczytko & Oszczytko-Clowes, 2010; 2014, Oszczytko et al., 2010). These deposits up to 1000 m thick are strongly tectonized and sometimes can be regarded as to kind of the "broken formation". These deposit are extended to the Eastern Slovakian sector of the Magura basin (Mařařovský & Andreyeva-Grigorovich, 2002).

During the Burdigalian at the front of the PKB and the Central Western Carpathians still existed synorogenic, residual Magura marine basin, which was at least 300-400 km long and up to 100 km wide (see also Kováč et al. 2016). This basin was supplied with detritic material from SE as well as from uplifted parts of the PKB and Magura Nappe.

The discovery of the Early Miocene flysch deposits of the Magura succession significantly modifies existing views on the structural evolution of the Outer Western Carpathians and Pieniny Klippen Belt.

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