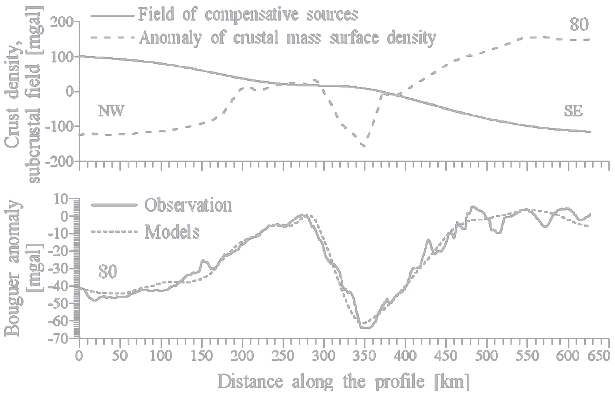
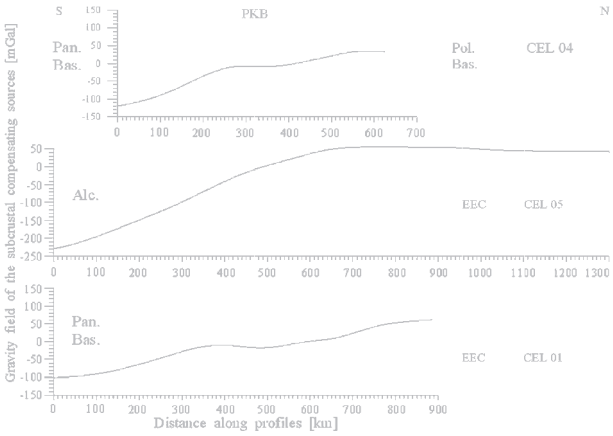


■ **Fig. 1.** Example of successful gravity modeling for profile CEL 04.



■ **Fig. 2.** Comparison of the spatial distribution of the field of compensating sources for the three Carpathian DSS profiles (CEL 01, CEL 04, CEL 05) crossing boundary of the orogen.

its value. Now, the modeling process can be regarded as successful in all three cases (Fig. 1).

The most interesting general results of tectonic character concern the presence of subcrustal isostatic compensation and its characteristic depth. Pronouncing regularity in the spatial distribution of the field of compensating sources (Fig. 2) seems to be a clear documentation of the state of the lower lithosphere showing a large anomaly below Panonian Basin, anomaly being a record of the rift process in the basinal area during formation of Carpathians. Another results concern the significance of the crucial Carpathian tectonic boundary and its present dynamical state.

Timing and Structural Style of Final Thrusting Movements of the Carpathian Orogenic Wedge, S Poland

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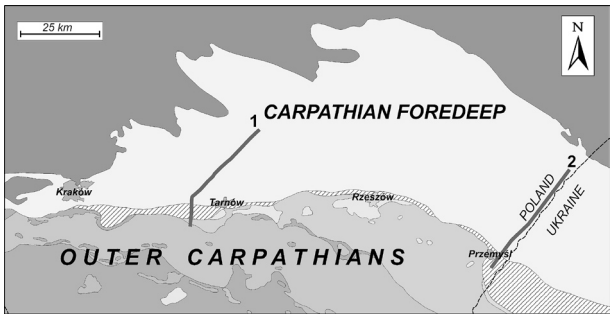
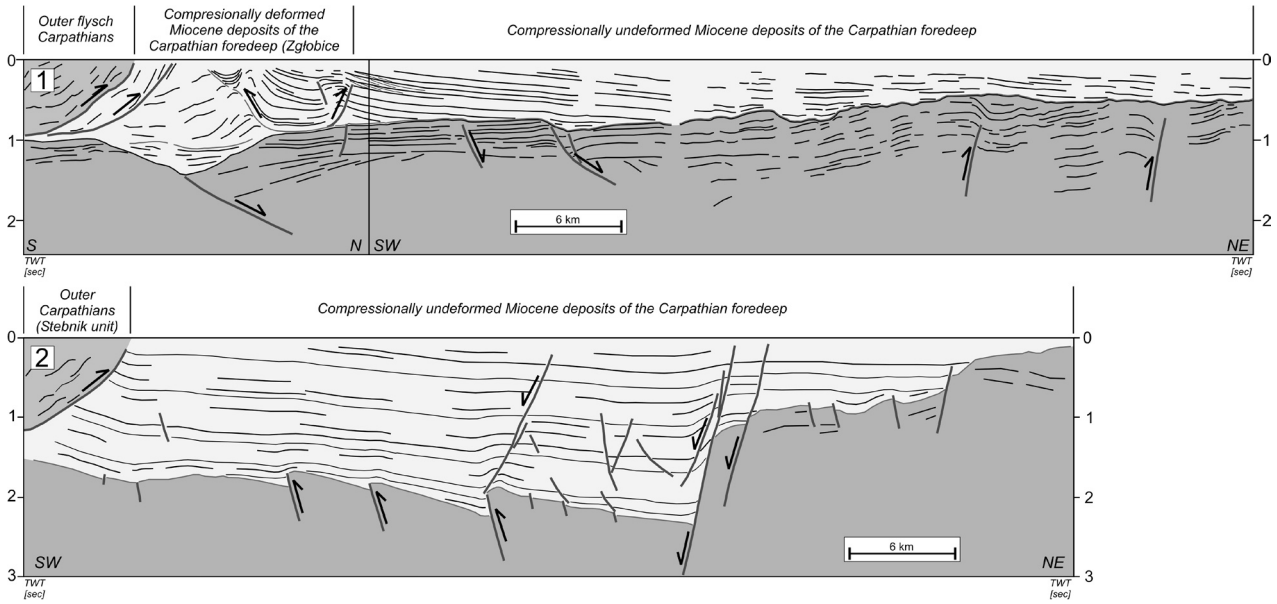
During progressive evolution of the thrust-and-fold belt deposits of the foredeep basin become progressively incorporated into the orogenic wedge. Such process is often syn-depositional, and consequently syn-kinematic (growth) strata from the foredeep infill could be used to decipher modes and timing of the thrusting movements.

Carpathian foredeep basin developed in front of the advancing Carpathian orogenic wedge (cf. Oszczypko et al. 2006 for further details and references). Its outermost part, presently located in front of the flysch (pre-Miocene) Carpathian units (nappes) is filled by the Badenian – Sarmatian deposits. In this paper two regional seismic lines are presented that illustrate very different gross structure of the orogenic front, foredeep basin and the foreland plate in central and E segments of the Polish Carpathians (fig. 1), and are used to constrain modes of final thrusting movements in this segment of this orogenic belt.

First profile (profile 1 – Fig. 2) is located in the central part of the Polish Carpathians and their foredeep basin, in vicinity of Tarnów. In this area frontal part of the orogenic wedge is built of relatively wide zone of deformed Miocene (Upper Badenian – Sarmatian) foredeep deposits that form the so-called Zgłobice Unit. These unit has been interpreted as a triangle zone cored by passive-roof duplex (Krzywiec et al. 2004). Formation of the triangle zone was controlled by morphology of the Mesozoic basement as well as by distribution of Upper Badenian evaporites. Within this zone numerous evidences of the syn-kinematic deposition have been identified, attesting to the latest Badenian – Sarmatian age of the final thrusting movements. They include progressive unconformities, localized thickness reductions within the crestal parts of the fault-related folds and small-scale fan deltas developed in front



■ **Fig. 1.** Location of regional seismic profiles from the central and eastern segments of the Polish Carpathian foredeep basin. Deformed foredeep deposits (older – Stebnik unit, and younger – Zgłobice unit) are shown by obliquely patterned area.



■ **Fig. 2.** Regional profiles from the central (1) and the eastern (2) segments of the frontal Polish Carpathians and their foredeep basin. Note very different structure of the orogenic front and the foreland plate observed along both profiles.

of the growth folds (cf. Krzywiec 2001). Foreland plate is characterized by rather gentle flexural profile without signs of any major flexural extension.

Very different picture is shown on profile 2 from the E part of the Polish Carpathians and their foredeep basin, located above the Teisseyre – Tornquist Zone (fig. 2). In this area Carpathian front is defined by rather sharp frontal thrust fault along which Miocene deposits of the Stebnik unit together with the Carpathian flysch nappes are overthrust above the compressionaly undeformed Badenian- Sarmatian deposits of the outer foredeep basin. Foreland plate shows large amount of flexural extension related to the late Badenian – Sarmatian reactivation of the fault zones belonging to the T-T Zone. Traditionally, using geometrical relationship between the hangingwall and the footwall of the thrust front, it was assumed that the thrusting movements were post-depositional in respect to the foredeep infill presently located in front of the orogenic wedge. Such a model would however require formation of large-scale fault-bend fold above the presently preserved foredeep infill. Considering structure of the thrust front and the foreland plate as well as the geometry of the Miocene infill in front of the orogenic wedge it is proposed that final thrusting occurred during flexural extension of the foreland plate and related sedimentation within the foredeep basin. Consequently, foredeep infill presently located in front of the Carpathian frontal thrust could be regarded as a syn-kinematic, not pre-kinematic, similarly to the central part of the Polish Carpathians.

Acknowledgements

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References

KRZYWIEC P., 2001. Contrasting tectonic and sedimentary history of the central and eastern parts of the Polish Carpathian Foredeep Basin – results of seismic data interpretation. *Marine & Petroleum Geology*, 18(1): 13-38.

KRZYWIEC P., ALEKSANDROWSKI P., FLOREK R. and SIUPIK J., 2004. The structure of the Outer Carpathian orogenic front: an example of the Miocene Zgłobice unit between Brzesko and Wojnicz – new data, new models, new questions. *Przegląd Geologiczny*, 52(11): 1051-1059 (in Polish with English abstract).

OSZCZYPKO N, KRZYWIEC P., POPADYUK I. and PERYT T., (2006). Carpathian Foredeep Basin (Poland and Ukraine) – its sedimentary, structural and geodynamic evolution. In: F. PICHA and J. GOLONKA (Editors), The Carpathians and Their Foreland: Geology and Hydrocarbon Resources. AAPG Memoir 84. (in press).