



The eastern extent of the Variscan belt in SE Poland and W Ukraine revisited

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High-quality seismic reflection data recently acquired in SE Poland provide new insights into the structure of the contact between the East European Craton (EEC) and the younger terranes to the SW. Our study focuses on two regional tectonic units: (1) the Radom-Kraśnik Block (RKB), a NW-SE elongate structural high where early Palaeozoic to Devonian strata subcrop beneath the Permo-Mesozoic cover, and (2) the Lublin Basin (LB), a major Palaeozoic sedimentary basin developed above the SW slope of the EEC and filled by the Neoproterozoic – Carboniferous strata. The RKB separates the LB from the Małopolska Massif (MM) and Łysogóry Unit (LU) that are usually considered early Palaeozoic terranes docked to the SW EEC margin.

The seismic data show a continuous top-EEC basement that descends from ~2 km in the NE to ~20 km under the SW part of the RKB. The RKB and LB represent a NE-vergent thin-skinned system thrust toward the EEC with the thin-skinned fabric oriented oblique to the slope of the EEC basement. The RKB is a thrust stack that imbricates a 10-12 km thick pile of Neoproterozoic to Devonian sediments. A leading edge of the RKB is a triangle zone related to the jump of the basal detachment from a basement-cover interface to Silurian shales. The passive roof of this triangle zone involves Carboniferous strata. This defines the age of thrusting as Variscan.

A minor amount of slip that has been conveyed to the Lublin Basin has been accommodated by a gentle deformation of the post-Silurian series. The thin-skinned deformation front is given by the Kock Fault Zone (KFZ) that is a frontal thrust forced to emerge above a step in the Precambrian basement. The KFZ could be partly regarded as an analogue to MUSHWAD structures described in the Appalachian foreland fold-and-thrust belt. It also could be a triangle zone like those in the Appalachian Plateau, but is more similar to the type triangle zone in the Canadian Rockies Foothills. Reinterpretation of published tectonic models for the W Ukraine demonstrates the continuity of structural style between the RKB and the Biłgoraj- Rawa Ruska Block, the along strike extension of the RKB toward the SE.

The minimum thin-skinned shortening in the RKB and the LB is ~15-20 km. This has been transferred from the SW which testifies for the Variscan emplacement of the MM onto the margin of the EEC. A continuity of the basal detachment between the MM, LU, RKB and the LB is a consequence. This is supported by analogy with the western Variscan belt, such as the Ardennes or the Appalachians. This similarity is strengthened by seismic evidence for the Early Devonian "Acadian" unconformity in the thrust sheets of the RKB. Our results provide a basis for a new regional model of the Variscan frontal deformation, situated hundreds of kilometres farther E than usually believed, and unequivocally encroaching on the EEC margin.