



Variscan external fold-thrust belt or locally deformed foreland basin - the unsolved question of the tectonic setting for the Carboniferous clastic succession of western Poland

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The Carboniferous sedimentary succession of western Poland comprises mostly clastic marine sedimentary rocks that were, at least locally, folded and thrust-faulted before Permian times. The succession exceeds 2500 m in thickness and is entirely buried underneath an up to 4 km thick Permo-Mesozoic to Cenozoic sedimentary infill of the Polish Basin. Its subcrop area extends between the Variscan crystalline basement exposed in the Bohemian Massif to the south and the SW margin of the East European Craton. The Carboniferous succession of western Poland comprises a monotonous series of upper Visean through Westphalian turbidites traditionally interpreted as flysch locally overlain by upper Westphalian to Stephanian shallow water molasse. The rock complexes underlying the Carboniferous remain mostly unknown, except those elevated within the WNW-ESE trending Leszno-Wolsztyn High (LWH). The latter comprises upper Devonian phyllites affected by multi-stage low-grade metamorphism, which terminated at ca 340 Ma. The NE border of the LWH is the Dolsk Fault, a major discontinuity between a low-velocity Variscan crust to the SW, and a three-layer 'transitional' crust of suspected East Avalonian affinities to the NE. The Carboniferous turbidite succession of western Poland has been interpreted to comprise two distinct, though genetically linked, sedimentary suites of the Variscan orogenic wedge and of the foreland basin, respectively, separated by the Variscan deformation front. The location of the Variscan front in Poland, however, remains controversial due to scarcity of borehole data and unclear criteria of distinguishing between the external

thrust-and-fold belt and the foredeep. The significant features of the Carboniferous turbidite succession in western Poland can be summarized as follows: (1) the upper Viséan flysch rests directly on top of the phyllites of the LWH (2) sediments older than the late Viséan(?)/Namurian A are missing from the SW and central parts of the Carboniferous subcrop area; (3) sedimentation probably continued from the Tournaisian onwards without major stratigraphic gaps in the N part of the basin; (4) the Carboniferous succession is fairly uniform in terms of its stratigraphy, facies development and sediment composition in the SW and central parts of the basin; (5) an important part of the detritus supplied to the Carboniferous basin reveals latest Devonian cooling signature (370-355 Ma) similar to that revealed by the phyllites of the LWH; (6) inversion of the basin took place not earlier than in the Westphalian C. The cooling signature of the LWH metamorphic basement as well as the detritus supplied to the Carboniferous succession point to an important Late Devonian tectono-thermal event probably related to the early stage of the Variscan continental collision and resulting in an extensive nappe pile. The early Variscan external orogenic zone thus formed is buried below the Carboniferous and younger deposits and extends at least as far to the north, as the Dolsk Fault Zone. Therefore, the foredeep sedimentation in the Tournaisian and early Viséan was concentrated in the northern and eastern parts of the Carboniferous basin. In late Viséan times, a major uplift of the Variscan internal orogenic zones in the adjacent Bohemian Massif resulted in inclusion of the areas located south of the LWH into the Variscan foreland basin. As a result, the Carboniferous foredeep succession overlapped the northern margin of the previously developed orogenic wedge and, thus, masked the position of the early Variscan thrust front. The ultimate, end Westphalian phase of Variscan shortening led to inversion of the Carboniferous basin under a dextral transpression regime and to localised deformation, presumably near to major strike-slip fault zones, controlled by basement features. Any single, late Carboniferous Variscan deformation front cannot thus be effectively delineated in Poland.