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Piotr Krzywiec[1] (1) Polish Geological Institute, Warsaw, Poland

Decoupled vs. Coupled Mesozoic Evolution of the Mid-Polish Trough - Role of Salt During Basin Extension and Inversion

Permian to Cretaceous Mid-Polish Trough (MPT) belonged to the system of epicontinental depositional basins of western and central Europe. Its sedimentary infill consists of several kilometres of siliciclastics and carbonates, including thick Zechstein evaporites. MPT was inverted in Late Cretaceous - Palaeocene times, at which time its axial part was strongly uplifted and eroded.

One of the major problems concerning evolution of the MPT is apparent lack of major extensional deformations responsible for several pulses of tectonic subsidence inferred from tectonic modelling studies. This could be explained by basin-scale mechanical decoupling between pre-Zechstein basement and Mesozoic sedimentary infill. Numerous seismic profiles, especially from NW part of the MPT, document mechanical decoupling between pre- and post-salt successions, lack of major normal faults above salt, and gradual thickness changes within the post-salt infill. During such decoupled extensional evolution major normal faulting was primarily restricted to the basement, and only secondary normal faults and associated deformations (extensional forced folds or salt structures) develop within the post-salt sedimentary infill. In central MPT extension was strong enough to cut through salt layer, and normal faulting involved both pre- and post-salt successions. This normal faulting, and related early stages of salt diapirs formation, has resulted in rapid thickness increase and prominent divergent seismic pattern of Triassic and Jurassic deposits.

Salt diapirs developed during extensional stage were reactivated during Late Cretaceous inversion in compressional regime. Some of them were transferred into blind syndepositional thrust structures cored by salt, while for some of them compression-related vertical salt movements prevailed.