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Permian-Mesozoic Evolution of the Klodawa Salt Structure, Central Mid- Polish Trough: Integration of Seismic and Mine Data with Analogue Models

Permian to Cretaceous, NW-SE trending Mid-Polish Trough (MPT) belonged to the system of epicontinental sedimentary basins of Europe. It was filled with several kilometres of siliciclastic and carbonate sediments, resting on a thick Zechstein evaporite sequence. Salt structures of Zechstein formed during extension of MPT in Triassic-Early Cretaceous. Late Cretaceous-Palaeocene inversion of the MPT led to uplift and erosion of its axial part.

Klodawa Zechstein salt wall is 6-km tall and 30 km long, trending parallel to the axis of MPT. The deformed sequences (Z1-Z4 cyclothems) within the diapir show various scale sheath folds, decollements/faults and boudines. Analyses of mine, well and seismic data indicate that the rise and deformation of salt had started not later than in Triassic and continued at least until Tertiary. During Triassic the structure evolved from a salt pillow into a diapir, growing above a basement extensional fault zone. In the latest Triassic the diapir developed an overhang, which was partly squeezed back towards the diapir by loading of the Jurassic and younger sediments.

Folding of the overhang points to shortening related to the later inversion in MPT. This is supported by sand-box models which show that broad diapiric overhangs formed during periods of slow sedimentation are folded during subsequent shortening. In natural cases, such folded overhangs may be the only indication for inversion in a basin. Similar to model diapirs, which dome their overburden as they are squeezed by later shortening, the Klodawa diapir domes Jurassic and younger sediments above its crest.