



Dawn and Dusk of Late Cretaceous Basin Inversion in Central Europe

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Late Cretaceous compression of the central European crust led to uplifts of varying scale and the evolution of related basins (marginal troughs), explained through loading by thickened crust. Fission track data and the depositional record (especially the composition of clastic sediments) have been used to constrain the timing of uplift, erosion and the start of re-deposition. Nevertheless, both methods are not very precise: AFT-ages reflect the cooling below 110°C and therefore the removal of about 3-4 km of overburden. Changes in sediment composition only occur if older rocks reach the erosion level; with the result that intrabasinal swells and submarine uplifts are not reflected in the sedimentary record. Therefore the timing of early uplift and basin formation during Late Cretaceous basin inversion is not well constrained. Similarly, the end of compression is often obscured by continued uplift (crust relaxation), deposition even on uplifting areas due to high base level, differential compaction inducing ongoing subsidence in basins, or later erosion due to regional uplift. To recognize the beginning of uplift and subsidence, slumps, slides and mass flows were used which develop by steepening of the sea floor. They originate at angles of a few degrees, but therefore again in an advanced stage of basin deformation. Investigations of thickness fluctuations and facies patterns seems to be the most promising tool to date inversion tectonic because they are expressed mostly immediately and can be traced easily by seismics, outcrop studies and boreholes. Data from the Saxonian part of the Bohemian Cretaceous Basin indicate fundamental changes in the depositional pattern already in the Upper Cenomanian, at least 5 Ma years earlier than known before and contemporaneous with the most pronounced transgression of the Cretaceous. Thickness data from the margins of the inverted Lower Saxony basin also suggest a significant enhancement in the same period. A sudden shift of depositional centres that probably heralds the end of inversion occurs in most basins still within the Campanian. Distribution of Maastrichtian and Paleocene deposits shows a completely different pattern than the syn-compressional units below.