



Hidden inversion tectonics in the Thuringian Basin (central Germany) - Structural analysis of the Schlotheim graben as an example of an inversion structure

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The Thuringian basin forms a regional syncline and shares a stratigraphic evolution similar to the North German Basin from Permian through Early Jurassic times. The Thuringian basin is delimited by the Late Cretaceous basement uplift of the Harz in the north. The Schlotheim graben, which was investigated here, is one of a series of NW-trending, parallel graben like fault zones in the Thuringian Basin.

The graben, which is well explored by boreholes, mines and surface mapping, was studied by detailed analysis of fault offsets and construction of balanced cross sections for the most strongly deformed area. Based on the results we present and discuss two contrasting models of the graben. The first model shows the interpretation of a “pure” graben, which was only influenced by extension, while the second model interprets a partially inverted graben. The graben shows only folds and normal faults at today’s surface, but tight recumbent folds and thrust faults in deeper horizons indicate contractional deformation. The strike of the contractional structures deviates slightly from that of the extensional ones. The investigated structure indicates that the magnitude of horizontal shortening is similar to that of the earlier extension. The overall longitudinal strain is set to net-zero during the contractional event while no detectable fault reactivation took place within the sedimentary cover.

Our results corroborate the conclusion from modelling studies that mild inversion is difficult to detect. Assuming that many Central European structures formerly interpreted as purely extensional are affected by such hidden inversion gives a regionally more consistent picture of the shortening event.