Syn- and Post-Sedimentary Tectonics of the Most Basin (Ohře Rift, Czech Republic); Insights from Reflection-Seismic Data

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The Most Basin located in the Ohře Rift (Eger Graben) Zone in NW Bohemia, is a relic of the largest sedimentary basin of this Cenozoic extensional province. During the syn-rift filling of the basin by volcanics and sediments during late Oligocene-early Miocene, the basin geometry was controlled by E-W (WSW-ENE) -striking normal faults, arranged in an en-echelon pattern, due to oblique NNE-SSW extension (Rajchl and Uličný 2000). In the present-day topography, it is difficult to recognize this syn-depositional fault system, because (1) the E-W fault system was strongly overprinted by younger NE-SW fault systems (e.g. Krušné hory Fault System) formed under later NW-SE extension (Adamovič and Coufal 1999, Rajchl and Uličný 2000) and (2) thick accumulation of peat is likely to have accommodated much of the brittle deformation. In spite of the abundance of borehole data and extensive open-cast coal mines, precise localization of many syn-rift tectonic features, and unequivocal discrimination of syn- and post-depositional activity of individual structures has commonly been difficult.

To clarify the problem of expression of syn- versus post-depositional tectonic deformation in the architecture of the present-day basin fill, 2-D reflection-seismic data acquired in early 1980 (Jihlávec and Novák 1986) were reprocessed and reinterpreted. The reflection-seismic lines 21/81, 22/81 and 68/83 are located in the central, deepest depocentre of the Most Basin.

The interpretation of the seismic data confirmed synsedimentary activity of small-displacement normal faults, active during the initial phase of basin opening and largely covered occurred under coal seam. Upward propagation of these normal faults was mostly accommodated in the coal seam, resulting in its local flexure. During the early stage of basin evolution, a low-relief (c. 100 m total relief) extensional horst structure separated the depocentre into two shallow grabens. This tectonic style corresponds to models of oblique extension (McCay and White 1995) and is in agreement with the interpretation of early basin geometry by Rajchl and Uličný (2000). The architecture of clastics overlying the main coal seam suggests, however, that in a later stage of basin filling, subsidence was controlled by major basin-bounding faults located outside the margins of the seismic profiles. Within the basin, the geometry of clastic infill was controlled predominantly by compaction of thick accumulation of peat, corresponding to the main seam. The profile 21/81 helped to precisely localize a synsedimentary transfer zone which bounded the central depocentre from NE. This syn-depositional structure was characterized by relatively low subsidence resulting in reduction of thickness of the coal seam and underlying deposits.

Onlap of lacustrine clays on the surface of the main coal seam close to the present-day Krušné Hory Fault Zone (KHFZ) suggests a relatively flat synsedimentary relief of NW-margin
The stratigraphic geometry of depositional systems is generally thought of as a product of the interplay of basin-floor subsidence, base-level changes, and sediment supply. The subsidence of basin floor is generally implicitly regarded as mainly tectonic and isostatic in origin, but it can be significantly modified by migration of ductile substrate such as salt, and by compaction. In coal-bearing basins, syndepositional compaction of peat plays a significant, but as yet not fully explored, role in the behaviour of depositional systems and the resulting stratigraphic geometries.

Acknowledgements
This research was financially supported by the Ministry of Environment of the Czech republic, contract No. OG-13/02.

References

Large-Scale Stratigraphic Geometries in a Rift-Margin, Lacustrine Delta System Influenced by Peat Compaction: Comparison of Field and Reflection Seismic Data (the Miocene Bilina Delta, Ohře Rift, Czech Republic)

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The stratigraphic geometry of depositional systems is generally thought of as a product of the interplay of basin-floor subsidence, base-level changes, and sediment supply. The subsidence of basin floor is generally implicitly regarded as mainly tectonic and isostatic in origin, but it can be significantly modified by migration of ductile substrate such as salt, and by compaction. In depositional systems with strongly compactible and migrating substrates, the feedback between sediment supply, loading and compaction/migration of the substratum leads to creation of local to regional accommodation and, at the same time, may have a strong influence on the resulting stratigraphic geometries. In coal-bearing basins, syndepositional compaction of peat plays a significant, but as yet not fully explored, role in the behaviour of depositional systems and the resulting stratigraphic geometries.

The early Miocene Bilina Delta is package of a fluvo-deltaic clastics deposited at the southeastern margin of the Most