Geophysical Research Abstracts
Vol. 19, EGU2017-13312-2, 2017
EGU General Assembly 2017

The link between tectonics and sedimentation in the Pannonian basin: seismic analysis of structural and stratigraphic features and compaction effects

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The architecture of sedimentary basins reflects the relationship between accommodation space and sediment supply, their rates and localization being variable during basin evolution. A novel kinematic and seismic sequence stratigraphic interpretation calibrated by wells allows the quantification of the link between the formation of half-grabens and coeval sedimentation in the Great Hungarian Plain part of the basin. While the lower order tectonic induced cycles characterize the main phases of extension in various sub-basins, the higher order cyclicity and associated unconformities define individual moments of fault (re-)activation. The combined kinematic and depositional model at the scale of the entire basin infers that the cumulated amounts of Early to Late Miocene extension were much higher than previously thought, reaching about 220-290 km.

The post-rift phase of the basin is associated with the evolution of Lake Pannon: an initial underfilled, balance fill and a final stage of overfilled large lacustrine basin. Paleobathymetric calculations based on the decompacted thickness of the prograding shelf-margin slope clinoforms indicate water depth values typically a few 100s meters up to $\sim$1 kilometer between the bottomsets and topsets. Additional 0-75 meters of water column covered the shelf controlled by climatically driven lake level variations. Sedimentary transport routes were primarily determined by inherited and/or local active tectonics including the control of the Miocene shelf-margin progradation directions and affecting recent fluvial geometries as well. Sediments up to $\sim$6 km thick are affected by continuous differential vertical movements and compaction creating gentle fold geometries and differential compaction induced faults, playing a major role in hydrocarbon migration and trapping.