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3D geophysical model of the Danube Basin based on gravity modelling

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The Pannonian back-arc system of Central Europe was affected by large amounts of Miocene extension controlled by subduction rollback that took place in the Carpathians and Dinarides. One of its largest sub-basins, the Danube Basin, is located at the transition zone between the Eastern Alps, Carpathians and the central parts of the Pannonian basin. Back-arc extension resulted in asymmetric crustal and lithospheric thinning, subsidence and accompanied by kilometres of syn- and post-rift sedimentary sequences.
Gravity modelling has been carried out in the Danube Basin applying the Oasis-Montaj software in order to refine and connect the brittle upper and ductile lower crustal structures. Our modelling is constrained by the interpretation of a dense network of seismic and well data and compared by recent thermo-mechanical basin modelling results (Balázs et al., 2017).
Half-graben geometries are well observed in seismic sections, while the deeper structures are more uncertain and therefore their interpretation required our joint seismic and gravity modelling approach. The gravity forward modelling software allows us to interactively change geometries, depths and lithology-density units; therefore different modelling scenarios can be tested and evaluated. An initial Moho surface and lower crustal geometry were used as a first approximation (Szafián et al. 1999). This initial model was followed by a series of parameter tests. Our final seismic interpretation and gravity modelling results infer 2 km post-rift and 1.5 km syn-rift sedimentary column overlaying an average 15 km of crystalline basement. The asymmetric geometries of the highly thinned brittle upper and ductile lower crust are comparable with observations from other highly thinned back-arc basins.
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