## Geo-energy exploration along the Austrian-Hungarian border in the western Pannonian Basin

Tari, Gabor

OMV Upstream, Trabrennstraße 6–8, 1020 Vienna, Austria.

In the border zone between Austria, Hungary and Slovenia, the Miocene opening of the Pannonian Basin was characterized by extreme, large-magnitude upper crustal extension accommodated along low-angle detachment faults. Due to several unsuccessful wells drilled mostly in the 1980s, the hydrocarbon exploration potential is perceived to be negligible in this region. Therefore, only a limited set of vintage 2D reflection seismic sections is available in this part of the basin. These profiles date back to the 1970–1980s and no modern infill 2D seismic profiles, let alone 3D seismic surveys, were acquired since then. Moreover, due to the presence of the Iron Curtain prior to 1990, previous interpretation efforts could not achieve the proper subsurface correlation of major structural elements across the political border. In this study numerous exploration wells, drilled on both sides of the border, were re-evaluated and integrated with reflection seismic data to differentiate between the lower versus upper plates of major low-angle detachment faults in the Burgenland High area separating the Styrian Basin in the west from the Danube and Zala Basins in the east. The refinement of the previously proposed metamorphic core complex (MCC) style, ENE-WSW to NE-SW oriented high-strain extension model provides a modern understanding of magnitude of back-arc extension in this part of the Pannonian Basin system due to the early Miocene collapse of the Alpine orogen. Uplifted and subaerially exposed isolated basement highs along the basin margin (e.g., Sopron and Stadelberg Mts.) are now considered as useful analogues for similar subsurface structural highs related to lowangle detachment faulting (e.g. Minihof and Bük Highs, respectively). Very thick (up to 800 m) syn-rift coarse clastics in the hangingwall of prominent low-angle faults, penetrated by a few wells in the area (e.g., Szombathely-II and Csapod-1), developed in a fanglomerate facies providing reservoir target units for geothermal exploration. This case study is also an example of interpretation of less-than-ideal legacy 2D seismic data sets (30–50-year-old) reproduced in variable formats (i.e., hard-copies scanned and georeferenced without reprocessing or even vectorization). From a structural geology perspective, the early interpretation of these vintage seismic profiles was done in the 1980s without the appreciation of the existence of low-angle normal faults and MCCs, in general. The reassessment of the same data sets used in this study definitely benefited from the knowledge gained on these special structural features by both the academia and the petroleum industry over the past 40 years. Given the increasing focus on low-carbon energy solutions, the broader region needs a modern re-evaluation of the subsurface geo-energy potential not related to hydrocarbons. The willingness to interpret a collage of “old” 2D seismic reflection data could provide critical new insights in many other underexplored basin segments globally in the context of the energy transition. Oil and gas companies, given their unique subsurface legacy data sets, will play a key role in the re-assessment of “forgotten” basin segments worldwide.