SEISMIC AND SEQUENCE ANALYSIS OF MIOCENE FILL OF THE VIENNA BASIN

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Abstract: The poster presents seismic and sequence stratigraphy of the Miocene fill in the Slovak part of the Vienna Basin. The main purpose was to analyse geophysical data – 2D seismic line and well log curves and geological data. The result is interpretation seismic facies and sequences, setting the seismic sequences model and hydrocarbon potential estimation of interpreted facies.

Key words: Vienna Basin, Miocene, seismic stratigraphy, sequence stratigraphy, sedimentary cycles, hydrocarbons

Extended Abstract

This work presents seismic stratigraphy and sequence stratigraphy of the Miocene fill of the Slovak part of Vienna Basin. The poster contains application of seismic and sequence stratigraphy using geophysical and geological data from the Vienna Basin.
Main task was interpretation 2D seismic lines and well log profiles. Seismic lines were measured by methodology CDP (Common Depth Point). Geological well log interpretation was done on the SP (spontaneous potential) and RT (resistivity) curves. The Vienna Basin was split to three parts – southern, middle and northern for the purpose of this work. The southern part represents area to Leváre depression, the middle part represents area between Leváre depression and Kúty graben and the northern part represents northern area from Kúty graben. Main effort was concentrated to the southern part – deltaic system in Middle and Upper Miocene. The middle and the northern parts present changes in Miocene evolution.
In the first step seismic unconformities were identified and preliminary interpretation of seismic facies and sequence boundary was done on the seismic lines. Independently, interpretation of the well log profiles were done with emphasis on the

interpretation of maximum flooding surface (mfs) and sequence boundary (SB) with using available well cores.
In the second step interpreted seismic lines were tied with well log curves by check shot data. Result was final interpretation of the sequences and facies.
Final result this part of work is model seismic sequences for southern, middle and northern part of the Vienna Basin .

There were 10 cycles of relative sea level changes identified in Miocene sedimentary record of Vienna Basin. The Eggenburgian and Ottnangian sediments each represents one sedimentary cycle divided by SB2. 2 cycles were identified in Karpatian sediments divided by SB1 on the base of Šaštín sands sedimentary body. Main 1st type sequence boundaries (SB1) unconformities were identified on the seismic lines. The major angular unconformity was identified between Karpatian and Badenian sediments. Most of Lower Badenian period is represented by hiatus and we suggest about one million years of sedimentary record of *Praeorbulina Glomerosa* zone is missing in Slovak part of Vienna Basin. There are 3 transgressive systems tracts in Badenian sedimentary formations: 1) *Orbulina Suturalis* zone in Lower Badenian, 2) transgressive finning upward of the terminal part the Matzen and Lab sands on the base of S*piroplectamina Carinata* zone in Middle Badenian and 3) Upper Badenian transgression with *Bulimina – Bolivina* zone covering whole basin.
During Sarmatian and Panonian period Vienna Basin became shallower with decreasing water salinity. Seismic picture of Sarmatian and Panonian sediments shows horizontal and subhorizontal reflectors cutted by channel fill bodies. Sedimentary cycles reflecting relative sea level changes could be identified using well core and log data.

Interpreted sequences shows that tectonics played an important role during the Middle and Upper Miocene creating Gbely – Hodonín horst, Závod Monoclinal slope and Láb – Malacky horst. These movements strongly influenced present position of interpreted facies and sequences.
Next part of work was concentrated to the southern part where structural maps and thickness maps of individual facies were constructed. Maps were constructed from interpreted 2D seismic line and well log data. Transformation from time to depth was done by velocity map.

Final step of the interpretation was 3D visualisation of the facies and sequences integrated with seismic line and well log curves.

Final result is hydrocarbon potential estimation of interpreted facies. We can predict that perspective hydrocarbon reservoirs are either LST sands particularly channel fill sands either transgressive sands which pinch out and they are sealed by mfs shales. In the Pannonian basal 8th sand represents deltaic distribution channel fill covered by transgresive marine shales. In the Sarmatian deltaic sand bodies could create litological and/or structural traps. The most promising Badenian horizons still remain transgressive "sand tongue", massive Suchohrad sands (LST) with possibilities both structural and non-structural traps. Karpatian has still the lowest perspectivity in the Neogenne fill. Ottnangian and Eggenburgian have a potential in the northern part mainly in the Kopčany depression in structural traps.

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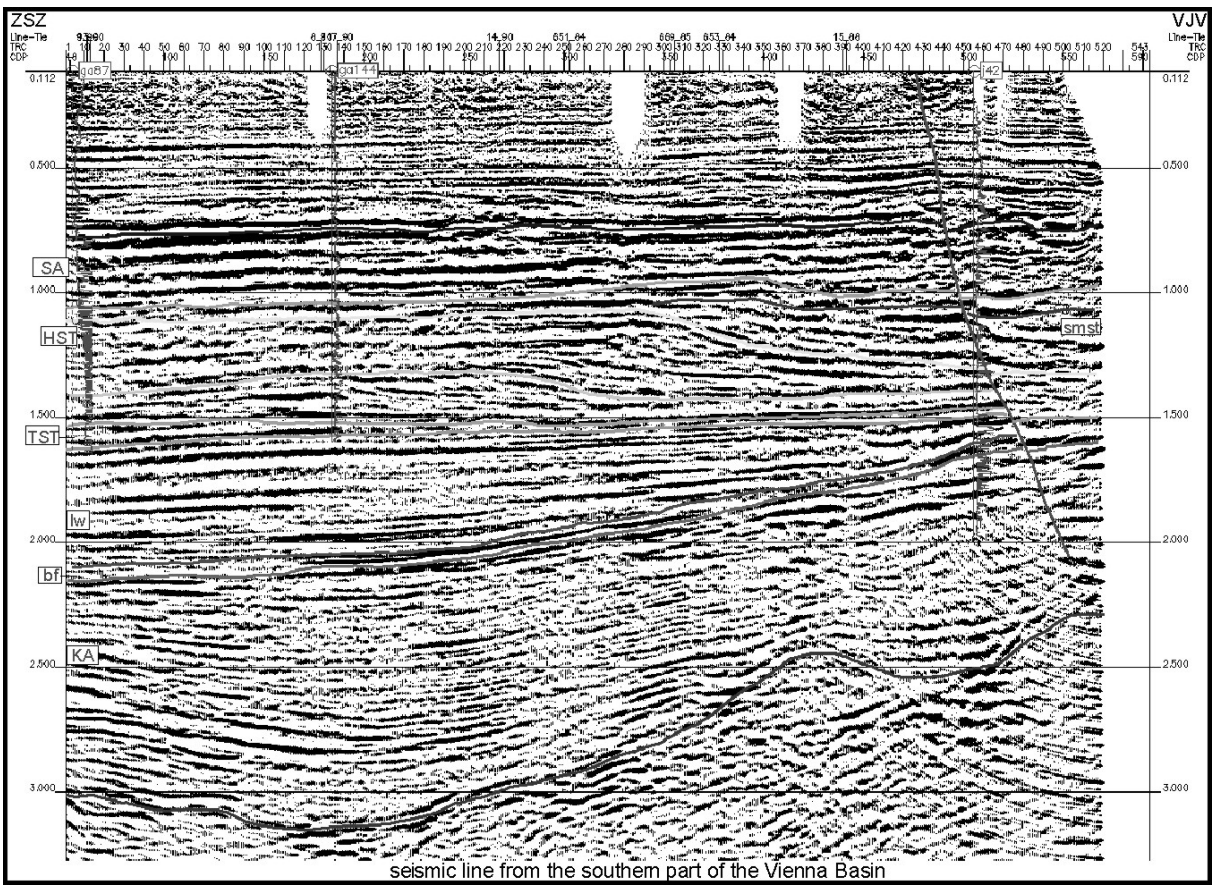
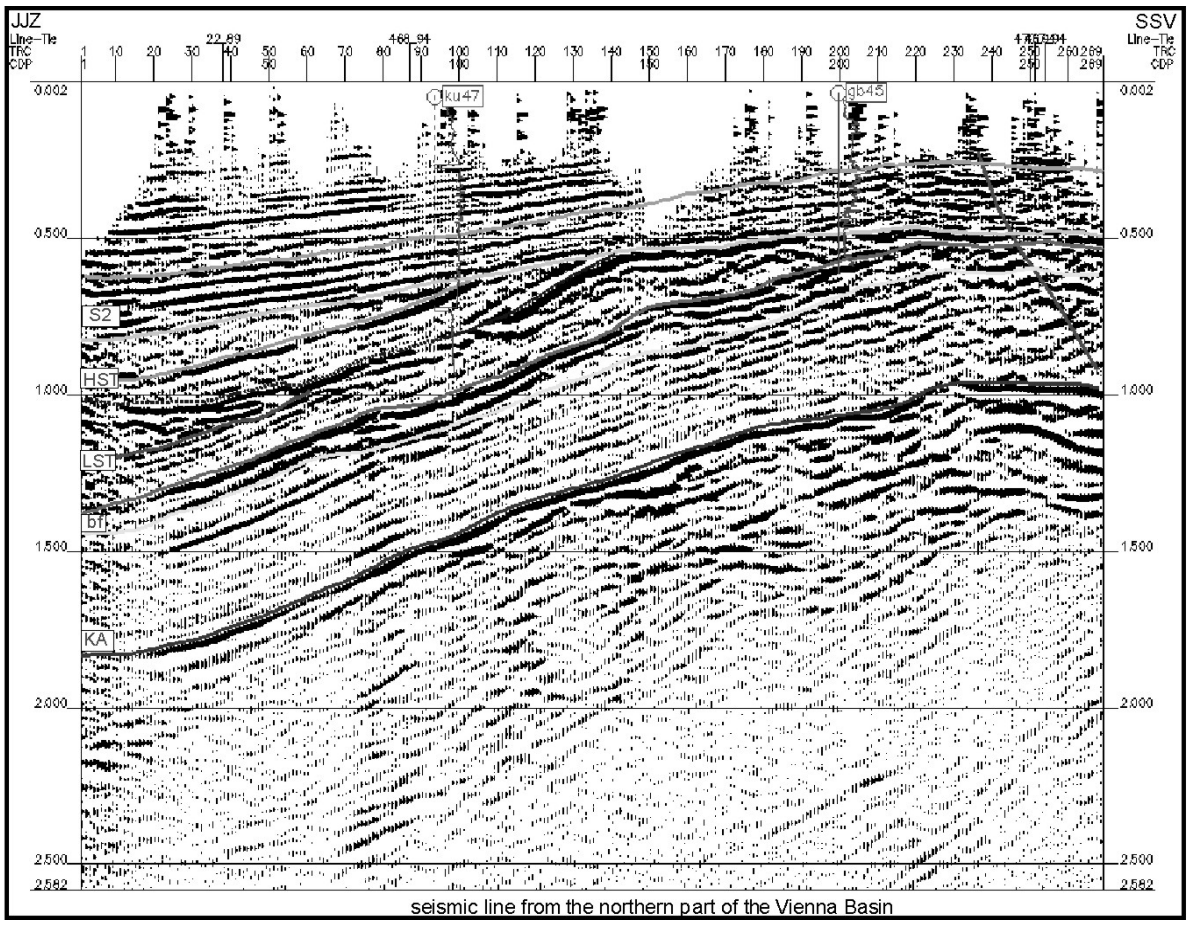
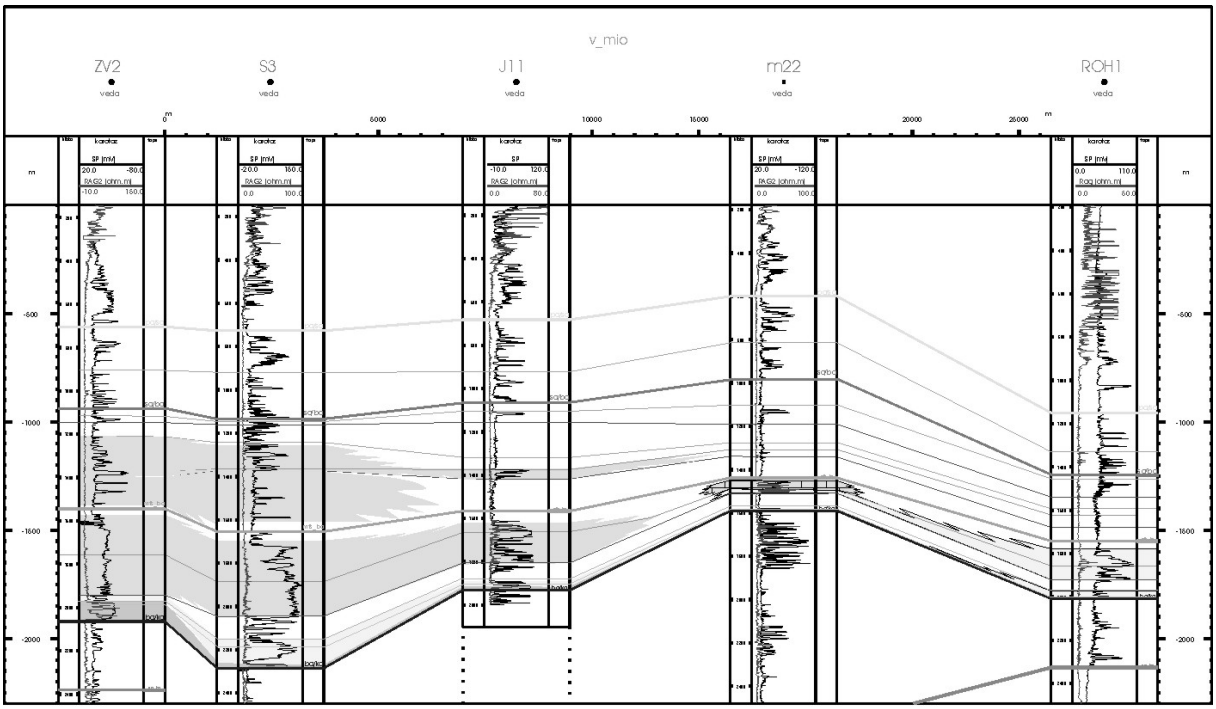


seismic line from the southern part of the Vienna Basin



seismic line from the northern part of the Vienna Basin



well log profile in the southern part of the Vienna Basin