Study of Late Miocene-Early Pliocene evolution of the Dráva Basin, based on spectral decomposition and well log correlation

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The Dráva Basin is the south-western sub-basin of the Neogene-Quaternary Pannonian Basin. The Late Miocene sedimentary succession of the Dráva Basin is built up by deposits of the Lake Pannon which indicated gradually decrease of salinity. The prograding shelf margin reached the Dráva Basin before 6.8 Ma (Magyar, 2013). Late Miocene inversion of the basin generated a major unconformity (Magyar & Sztanó, 2008) at the boundary of alluvial and shelf formations. This significant surface is characterized by onlapping reflectors terminated on the unconformity itself (Pogácsás, 1984).

The sediment infilling process of the Dráva Basin was reconstructed by stratigraphic and facies interpretation of a 12x17 km 3D seismic survey and logs from five wells. Dozens of seismic events were correlated and mapped. Amplitude maps for each horizon picked on constant phase were performed as well.

Due to the basin inversion, flattening the 3D seismic data was needed to identify the slope related horizons. Selecting the flattened horizon was based on restoring the conditions at the time of deposition.

In the Dráva Basin the southeastward migrating shelf margin was formed by aggradational and progradational clinothems. Determination of these clinothems was necessary in order to understand their migration path. Aggradational clinothems are characterized by rising shelf-edge trajectories, while the progradational ones are related to nearly horizontal shelf-edge trajectories. Rising shelf-edge trajectories indicate the rising of the Pannonian Lake level, while horizontal shelf-edge trajectories reveal steady state lake level.

To observe the typical morphological elements of aggradational and progradational period, spectral decomposition from shelf related horizons were performed. Applying spectral decomposition is useful to indentify the lateral geological discontinuities with higher certainty. To transform time domain to ferquency domain Discrete Fourier Transform (DFT) was applied within time gate of ± 25 ms around each selected horizon slice. Red-green-blue (RGB) maps were made by the blending different frequencies (Fig. 1.).

RGB colour blended map shows depositional environments of shelf to basin floor. With this method stratigraphic features, such as shelf-edge, slope canyons, toe-of-slope lobes and structural settings became obvious.

In some part of the study area the prograding delta on the shelf could be recognized, indicating that taking into account the seismic resolution, the height of these delta features are up to 40-50 m.

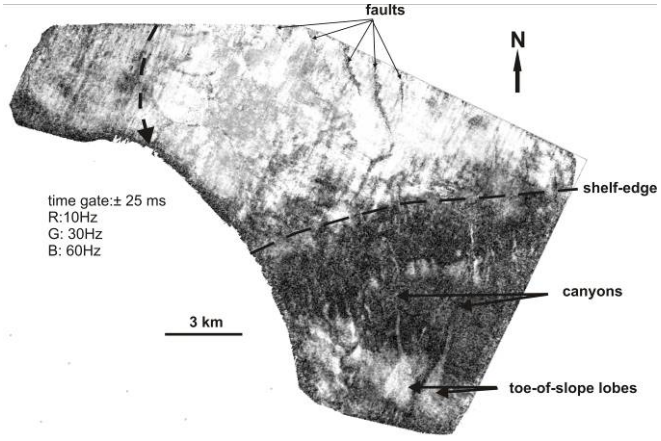

Fig.1. Spectral decomposition map and red-green-blue (RGB) colour blending of a seismic horizon shows depositional environments of shelf to basin floor.

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