Seismic interpretation of Neogene sediments; Jászság Basin, Hungary

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The Pannonian Basin is a back arc lake basin, surrounded by the belts of the Eastern Alps, Carpathians and Dinarides. The sub-basins of the Pannonian Basin are filled by varying thickness Neogene sedimentary rocks. These strata usually overlie the pre-Neogene basement with an erosional unconformity. My study area lies in the eastern Pannonian Basin, (Jászság sub-basin). The deposition of Upper Miocene sediments were charactized by sediment input from north-east (paleo-Tisa direction) and north-west (paleo-Danube direction) (Pogácsás, 1984). The deltaic systems were prograded southward direction and progressively filled the Lake Pannon between 11.6-2.6 Ma (Juhász *et al*., 2007). The age of the basin fill sediments varies (from Middle Miocene to Pliocene), the Neogene sedimentation was controlled by the different intensity of the Neogene subsidence (Pogácsás, 1984).

This work based on partly 3D, partly 2D seismic data of the Jászság Basin, Kunmadaras area. The aim was to identify the Late Miocene depositional environments that range from the deep-water basin plain, slope, delta front to alluvial plain. The seismic interpretation was integrated with well- and core-logs.

The mapping was undertaken at different stratigraphic levels on the 3D dataset. Seismic attribute extractions were generated to illustrate the environments, geometries. Spectral decomposition maps (Fig. 1.) were constructed too, to identify meandering channels, channel-leeave systems, mass flows. The most prominent identified features are the submarine channels cutting into the slope and into the previously deposited toe of slope deep-water sediments. This imaging method helped a lot to interpret and to understand the details of the subsurface stratigraphic architecture.

The Late-Neogene basement of the Kunmadaras area is becoming shallower from northwest to southeast because the late uplift of the south-southeast part of the study area. The thick Upper Miocene sedimentary succession is built up by various strata from deep lacustrine to fluvio deltic facies. The lower part of the deep-water basinal succession is mostly characterized by hemipelagic marls, while above it deep-water turbiditic sands can be found. The turbidites system are characterised by channels and submarine slumps (Fig. 1.) which can be seen fairly well on the spectral decomposition maps and amplitude maps. The slumping was probably caused by tectonic activity along a wrench fault zone resulting in the failure of loosely packed sediments on the slope (Juhász *et al*., 2013). The uppermost part of the deep-lacustrine succession consists of mostly slope marls, siltstones which are widespread throughout the study area. On section view we can recognize the slope by its sigmoidal to oblique reflections pattern. The sediment of the slope are overlain by upward coarsening shoreface and deltafront facies. Delta plain sediments are thinner than the other facies in the study area. The delta plain sediments are overlain by thick alluvial deposits, mainly clays and silts with thinner and thicker sand beds. On the maps of the alluvial plain facies rivers channels seem to be appearing, although the individual river channels are not drawn out as sharply as the well developed feeder channels of the deep-water to of slope environment.

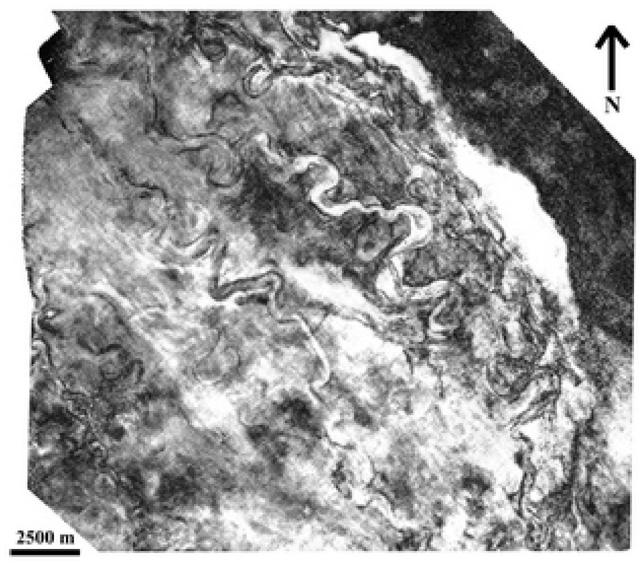

Fig. 1.: Spectral decomposition map constructed by Discrete Fourier Transform (DFT) to identify deep-water channel-levee complexes (around 1300 ms TWT)

A very specific feature of the study area is the meeting of two major sediment systems characterised by different input. It is assumed that initially the north-north east source direction was dominant because of the larger thickness of the sediments on the north-northeast. Subsequently the main sediment input come from north-northwest direction, which again was replaced by the dominance of northeast sediment input direction again.

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