Geophysical Research Abstracts
Vol. 15, EGU2013-969, 2013
EGU General Assembly 2013


# High-resolution seismic surveys in the Lake Balaton to image the stratigraphic architecture of Late Miocene basin fill beneath the lake

Ferenc Visnovitz, Attila Balázs, and Ferenc Horváth
Eötvös Loránd University, Department of Geophysics and Space Science, Budapest, Hungary (kefe@fazekas.hu)

In the area of Lake Balaton ultrahigh-resolution single channel seismic surveys have been carried out in a total length of 1300 km in the past 20 years. In addition, a 500 km of multichannel profiles were also measured in cooperation with the University of Bremen, Germany. Multichannel profiles can give an image of the main structures of the Late Miocene strata and follow their acoustic basement in a depth of 100-200 meters. However, the multichannel profiles have lower resolution relative to the single channel ones (5 meters and 0.2 meters, respectively). A joint application of the two techniques can offer a most complete stratigraphic and structural information particularly if it is combined with adequate well logs from the area.

The Lake Balaton with a present surface area of about 600 $km^2$ is a shallow water (0 – 4 m) with an average of 5 meters of calcareous mud deposited in the last 12 000 to 16 000 years. The mud is unconformably underlain by the Late Miocene strata, which represent the early postrift sedimentary fill of the Pannonian basin. The termination of the synrift phase is defined by Sarmatian (11.3 to 13 Ma) biogenic limestones which represent the acoustic basement in major part of the area. The syn/postrift boundary is normally at a depth of 2 to 4 km in the Pannonian basin and the elevated position over here in the Balaton region is connected to the Quaternary uplift and erosion of the Transdanubian Central Range.

The shallow position of the Late Miocene strata, the overlying water and the unconsolidated mud allow the penetration of high frequency acoustic waves (100 – 2000 Hz). It results in decimeter to meter scale vertical resolution which can be directly compared to outcrop scale features.

All of these data can be interpreted in terms of shoreline clinoforms deposited on the landward edge of the shelf the same time when the major progradational and aggradational system (shelf-slope-basin chloroforms) filled progressively up the deeper parts of the Pannonian Lake. The shoreline clinoforms can offer evidence of climatically-driven cyclic lake level oscillations with maximum amplitude of 20 to 40 meters that are below the resolution of the hydrocarbon exploration land seismic. Periods of dryland conditions are suggested by occurrence of many mounded features which are interpreted as freshwater limestone banks.

Morphology showed by seismic sections hint to volcanic features which can be corroborated by magnetic surveys and correlated with basaltic butes with known ages around the lake. This gives us the chance to date the time and rate of tectonic deformations, particularly determine the slip rate of the major left-lateral strike-slip fault parallel with the longitudinal axis (WSW-ENE) of the lake. This could be an essential information for the whole Pannonian basin as its neotectonic activity is controlled by this and other similar strike-slip faults.