

Structural analysis of neotectonic activity in the Lonja-Ilova basin between Daruvar and Kutina (North Croatia)

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The study area is located in the western part of Slavonia, at the centre of the Ilova Basin between Daruvar and Kutina in northern Croatia. In geotectonic view, the studied area is located on the southern edge of the Tisia Megaunit, some 10 km north from the Sava-Vardar Zone (Pamić, 2002). Due to the uplifted morphostructure of the Papuk Mts., the hydrographic network is well developed: short streams at the northern slopes of the area drain to the Drava Basin, while streams at the southern slopes drain to the Sava Basin.

According to the opinion of various authors, the current position of the Slavonian Mountains is a result of multiple tectonic movements and rotations during the Miocene. This assumption is supported by detailed facies analysis of semi metamorphic younger Paleozoic and Mesozoic formations within the Tisia Megaunit (Kovács *et al.*, 1989), indicating that the crystalline complex of the Slavonian Mountains should be palaeogeographically linked to the northern margin of the Tethys. This is also consistent with the correlation of the ransgressive Mesozoic sediments, which was described by Šikić *et al.* (1975). The final uplift of the Slavonian Mountains is related to the Tertiary evolution of the Pannonian basin, which is according to Pamić & Lanphere (1991) related to the period of tectonic inversion during the Pliocene and Quaternary.

The aim of this work was to analyse surface and subsurface structures related to neotectonic and on-going tectonic activities. Fourteen reflection seismics sections – in total length of 303.42 km over a surface area of 484.58 km² arranged in NW-SE and NE-SW oriented grid were analysed using Petrel 2010 software. Time-depth structure contour maps were constructed using four stratigraphic horizons: the base Tertiary, the base Pannonian, the base upper Pontian and the base Pliocene-Quaternary. Morphometric analysis was done based on the digital elevation model (DEM) with 25-m resolution, analysed with ArcMap 10 tools.

The structural analysis indicated two neotectonically active faults: the Dežanovac and the Daruvar reverse faults, accompanied by kilometre-scaled anticlines in their hangingwalls. According to

their geometry, these are classified as *fault-propagation folds*. The magnitude of their displacement vectors varies from 800 to 350 m, which corresponds to the slip rate of 0.069-0.030 mm/year. The geomorphological analysis was carried out with the quantitative -relief and slope angle and qualitative morphological data-characteristics of drainage network; obtained from 21 catchment areas. Comparing with the data obtained by interpretation of reflection seismics and DEM-based morphometric analysis, it can be concluded that the subsurface structures have a direct expression on surface morphology and on drainage network, too. However, these can be found only locally, in cases, where fault slip rates and tectonics uplift exceeds the rate of erosion and denudation.

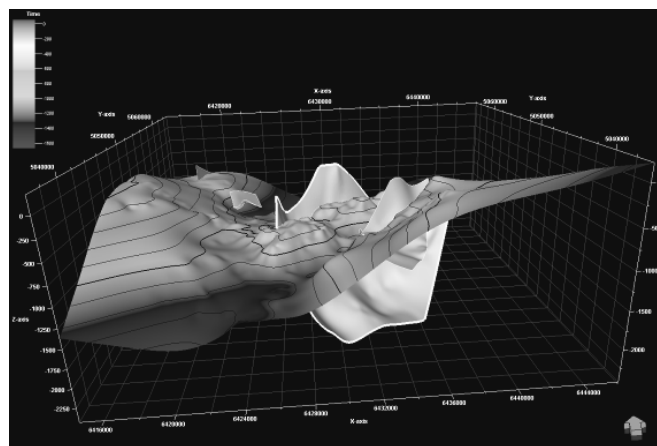


Fig. 1.: 3D surface horizon of Tertiary base with fault plane.

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