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Structural modelling of some synrift sub-basins in the Pannonian Basin

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The present day's structural view of the Pannonian Basin represents mainly extensional features and rejuvenated brittle structural history. Its structural evolution has been interpreted by the thermomechanical basin evolution model of MCKENZIE (1987). Development of the Pannonian Basin can be divided into two main consecutive phases: the tectonically more active synrift, and the following thermally controlled postrift phase of long subsidence and sediment accumulation (HORVÁTH 2007). The extension was achieved through broad rifting accompanied by the formation of metamorphic core complexes on the rims, great low-angle listric normal faults towards the central part of the Pannonian Basin, and in some areas, transfer faults connecting the normal faults (HORVÁTH 2007). During the thermal subsidence large amounts of sediment accumulated and deep sub-basins evolved during the Karpathian and Badenian (FODOR et al 1999, HÁMOR et al. 2001). The most obvious examples of this basin evolution type are the Dráva, the Száva sub-basin, and the Zagyva graben and the other sub-basins in the vicinity of the Mid-Hungarian Deformation Zone as well as each half graben of the Great Hungarian Plain (HORVÁTH 2007).

The aim of this study is to point out the difference between the main synrift tectonic elements of sub-basins on Tisza and ALCAPA megaunits. Some of the grabens and half-grabens were illustrated in artificial cross-sections. These sections were prepared using the proper paleo-stress field directions from borehole data and 2D seismic surveys. 2D restoration was performed along the sections in order to determine several parameters of the extension related to each other. Furthermore, extension parameters of the main synrift tectonic features (metamorphic core complexes, low-angle listric normal faults and transfer fault system) were compared to each other, and these were compared in the northern and southern megaunit of Pannonian Basin (ALCAPA and Tisza). The synrift tectonic elements were categorized based on the stretching parameters. The area of the metamorphic core complexes suffered the most extension, more than 30%. The second deformation type was the area of the low-angle listric normal faults, with a 20% amount of extension. Finally, the lowest amount of stretching was detected in the transfer fault zone, much less than 15%.

Information derived from certain basin divisions in an extended, Pannonian Basin scale environment with an average stretching ratio of approximately 1.5-1.6 (LENKEY 1999, HORVÁTH 2007), which includes both ductile and brittle deformation of the upper and lower crust, and all the brittle and ductile deformation. Our results compare the previous researches, observed spatial trend of the brittle deformation is the opposite of the ductile deformation, which is related to the great thickness of synrift sediments in the marginal areas compared to the thin synrift succession in the internal parts of the Pannonian. The integrated analysis of these results leads to understanding the forming geodynamic processes of Pannonian Basin.