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RECONSTRUCTION OF LATE MIOCENE AND EARLY PLIOCENE DIACHRONOUS INFILL OF MURA AND DRAVA DEPRESSION

REKONSTRUKCIJA GORNJOMIOCENSKE I DONJOPLIOCENSKE DIJAKRONE ISPUNE MURSKE I DRAVSKE DEPRESIJE

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The Upper Miocene to Pliocene sediments, referred to as Pannonian Stage in the Central Paratethyan regional chronostratigraphic terminology, were initially deposited in an underfilled lake basin displaying gradual a lake level rise. It was followed by a powerful lake level fall characterized by prograding and aggrading clinothems visible on seismic data sourced from the surrounding mountain chains and filling the basin system mainly from the NW and NE.

Detailed studies and analyses of the Pannonian sedimentary architecture were published mostly from the eastern part of the basin system, such as the Makó and Derecske troughs and the Békés basin, whereas from the western basins only interpretations of loosely spaced 2D seismic sections or small individual 3D volumes are available, all mainly restricted within the political boundaries of Hungary. Despite various related research in the southwestern part of the Pannonian Basin System (PBS), the overall geometry of the Lake Pannon progradational infill remained insufficiently known. The Mura and Drava basins, located in the SW part of the PBS in NE Croatia and SW Hungary, once took up a large portion of Lake Pannon and now hold several km thicknesses of Pannonian sediments.

Long-standing hydrocarbon exploration activity in the southwestern PBS resulted in the immense availability of reflection 2D and 3D seismic data. Over hundreds of 2D lines and over twenty 3D seismic cubes across the 20 000 km2 area were interpreted to create framework of clinoform system infill. Detailed seismic stratigraphic interpretation of the prograding clinoform complex enabled attribute analysis of 3D seismic data to fully investigate depositional processes and lithofacies associations, and sediment fairways. In order to reconstruct gradual progradation and to visualize paleogeographic evolution of the area in time and space, rollover trajectories of selected clinothems were mapped. The upper and lower subaqueous rollover boundaries of the slope (PELLEGRINI *et al.*, 2020) were marked throughout the study area by flattening the seismic sections onto shallower alluvial and delta plain surfaces which approximate palaeo-horizontals. Throughout the area 15 regional clinothem surfaces were mapped (Pa-1 to Pa-15).

Seismic-stratigraphy principles used resulted in clinothem framework representing short time intervals from 10^5 – 10^6 Ma deposited in various depositional environments. Clinothems reflect interaction of sediment supply and accommodation space controlled by thermal subsidence and climate-change.

Based on stratigraphic data linked with seismic, the rate of progradation and slope advance was calculated, and closing of Lake Pannon over time was visualized. Clinothems were mapped for the first time over the large Drava basin spatially defining closing of Lake Pannon during the Late Miocene and the Early Pliocene. Although often aggravated by lack or poor quality of the data, such framework considerably improved reconstruction of paleogeographic evolution and sediment fairways.

PELLEGRINI, C., PATRUNO, S., HELLAND-HANSEN, W., STEEL, R., TRINCARDI, F. (2020): Clinoforms and clinothems: Fundamental elements of basin infill. Basin Research, 32, 187–205, doi:10.1111/bre.12446.