What's common in Želiezovce Depression, Slovakia and Makó Trough, Hungary?

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Basin topography significantly alters the route of turbidity currents and determines the depositional architecture of turbidite systems, thus plays a confining role. This large scale of confining topography is 10s of kms in length, and up to several 100 meter high and are mainly related to the overall structural setting (Sinclair & Tomasso, 2002). Here two examples are presented from the Late Miocene lacustrine fill of the Pannonian Basin (PB).

The Makó Trough (MT) is one of the deepest depressions in the PB, where the Late Miocene lacustrine record exceeds 4200 m. It was a 60 km long and 30 km wide elongated basin with more than 1000 m high topographic relief along its flanks. The oldest turbidite systems deposited when the basement highs on the flanks were subaerially exposed. Beds of coarse- to fine-grained sandstones with Bouma-sequences and poorly sorted gravelly, silty sandstones with a variety of soft-sediment deformations appear between the open/deep-water siltstones. Despite the very short transport distances not only sandy grain flows but turbidity currents were active, the latter most likely reflected from the opposing slopes. Afterwards gradual flooding of the basement highs took place. These marls, however still contain intercalations of conglomerates, coarse sandstones still of local origin from debris flows and gravelly- to sandy turbidity currents. A very strange lumpy, silty-sandy facies also occur, interpreted as hybrid even beds (HEB, Haughton et al., 2003), one of the best indicators of confinement. With the overall regression, at about 7 Ma ago the delta-shelf-slope feeder system bypassed the largest topographic barrier northwest to MT. Turbidity currents, transporting sand from distal Alpine-West Carpathian sources arrived to the ultimate sink without being trapped in upstream depressions. In the still deep and narrow trough in the following 1 Ma basin-centered sandy turbidites accumulated up to a thickness of 1000 m in form of small compensationally stacked lobes. Presence of HEBs, lack of clays and silts and direction of channels reveal that the eastern flank of MT still acted as a topographic barrier. Finally the differences in relief got mostly eliminated by filling up the depression, and the feeding shelf-slope progressed with 600 m high clinoforms. The reduced thickness of lobes in the related turbidite system indicate fairly free spreading and the cease of confinement.

Želiezovce Depression (ZD) is the 70 km x 50 km eastern portion of the Danube-Kisalföld Basin (DKB). As the ZD was connected to the deep central part of the DKB from the east it does not look like as a classic confined setting. However, from the east it was bounded

by a large Middle Miocene volcanic edifice, from the Kozmálovce High (the SW part of the Štiavnica Stratovolcano) in Central Slovakia to the Börzsöny Mts. in Hungary. Although direct sediment input into Lake Pannon is not known from these volcanoes, it is supposed that they were exposed during the Late Miocene. From the south ZD was bordered by the Gerecse Hills, which was an exposed Mesozoic-Palaeogene block up to 9.2 Ma ago, but afterwards it became a flooded basement high, later covered by offshore clays and deltaic lobes (Magyar et al., *this volume*; Bartha et al., *this volume*). A similar situation is reflected by the nearby Modrany-1 and Nova Vieska-1 wells: its block shows a deeper position, because offshore clays are overlain by ca. 350 m thick slope shales, followed by deltaic lobes coeval with those of the Gerecse Hills (Šujan et al., 2016). Lack of turbidites indicates that both of these blocks were high enough to form a topographic barrier for turbidity currents arriving from the prograding shelf-slope at E-NE-N (Magyar et al. 2013). Deposition of turbidites might began at about 10 Ma ago at this area, but with the progradation of the slope the basin gradually became smaller, by 9.2 Ma ago <40 km wide only, practically with full confinement. This is revealed by the thickness of stacked turbidite sands (up to 1000 m) in Kolarovo-1 and -2 wells (Šujan et al., 2016). This is an extremely thick value if compared with the thickness of turbidites in the S, SW parts of the DKB, where it rarely attains 300 m. The topographic difference between the central and marginal parts of ZD might have exceeded 1000 m over a distance of 20 km, which may indicate a coeval structural control at the basin margin. Small-scale proofs of confined turbidites can be found by revisiting the cores of these wells.

Due to the structurally complex character, the highly variable lake-floor topography several other depressions in the PB are candidates of confined turbidite accumulations.

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