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Small-scale Quaternary flexural basins in the Carpathian-Pannonian system: the Transdanubian Sarret Basin as an example

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There are several minor, ca. 5-10 x 10-20 km subbasins within the Pannonian Basin, bordered by an uplifted basement block on one side and Late Miocene (Pannonian) sediments on the other side (Balaton, Sarret, Velence, Zamoly, Ferto, Pecs, Torna, Fagaras, etc.). Basin fills are Quaternary fluvial and lacustrine sediments. Basin elongation is subparallel with recent maximum horizontal stress trajectories of Bada et al. (1998).

Evolution of the best-studied Sarret Basin (NE of Lake Balaton, S of Bakony Mts) is here described by paleontological dating techniques, by petrography and sedimentology of fluvial sediments, and by observations in structural geology. Four distinct steps are recognized:

- An Early Pleistocene (Villafranchian), flat, fluvial landscape, dominated by a large river (Paleo-Danube) transporting quartz sand and fine dolomite gravel from a mostly buried Bakony range. Fossiliferous (mammals) and other localities are correlated by micromineralogical correlation of river sediments, and verified by mollusc fauna. There is no Sarret Basin whatsoever.
- Middle Pleistocene: Sarret Basin formed: Paleo-Danube carrying coarse gravel from the exhumed Bakony Mts and Velence granite. Middle Pleistocene surface ca. 100 m lower than Early Pleistocene one. Dated by mollusc fauna.
- Late Pleistocene: similar to present-day scene: Sarret Basin received a large

fanglomerate fan from the northern margin made of Triassic limestone. Dated by large mammals. Middle Pleistocene surface deformed by active thrust.

- Holocene: alternating fluvial and lacustrine sedimentation: active tectonic deformation repeatedly dammed and drained a marl lake. Dating: U-series, molluscs, pollen.

Northern margin of Sarret Basin is an active transpressional thrust fault. The southern, flexural margin displays features of extension and normal faulting in Lower Pleistocene sediments.

Suggested mechanism of basin formation: (1) small-scale flexural basin adjacent to crustal-scale transpressional flower structure, (2) reactivation of Tertiary thrusts.

Implications: the recent stress field has been active since at least Middle Pleistocene time. Present-day inversion of the Pannonian Basin started approx. at the Early/Middle Pleistocene boundary.

Reference

Bada, G., Cloetingh, S., Gerner, P., Horvath, F. 1998. Sources of recent tectonic stress in the Pannonian region: inferences from finite element modelling. Geophysical Journal International 134, 87-101.