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Littoral sedimentation of rift lakes: an illustrated overview from the modern to Pliocene Lake Turkana (East African Rift System, Kenya)

Mathieu Schuster and Alexis Nutz
UMR 7516 CNRS-Université de Strasbourg, Institut de Physique du Globe de Strasbourg (IPGS), Strasbourg, France

Existing depositional models for rift lakes can be summarized as clastics transported by axial and lateral rivers, then distributed by fan-deltas and/or deltas into a standing water body which is dominated by settling of fine particles, and experiencing occasional coarser underflows. Even if known from paleolakes and modern lakes, reworking of clastics by alongshore drift, waves and storms are rarely considered in depositional models.
However, if we consider the lake Turkana Basin (East African Rift System, Kenya) it is obvious that this vision is incomplete. Three representative time slices are considered here: the modern Lake Turkana, the Megalake Turkana which developed thanks to the African Humid Period (Holocene), and the Plio-Pleistocene highstand episodes of paleolake Turkana (Nachukui, Shungura and Koobi Fora Formations, Omo Group).
First, remarkable clastic morphosedimentary structures such as beach ridges, spits, washover fans, lagoons, or wave-dominated deltas are very well developed along the shoreline of modern lake Turkana, suggesting strong hydrodynamics responsible for a major reworking of the fluvial-derived clastics all along the littoral zone (longshore and cross-shore transport) of the lake.
Similarly, past hydrodynamics are recorded from prominent raised beach ridges and spits, well-preserved all around the lake, above its present water-level ($\sim$360 m asl) and up to $\sim$455 m. These large-scale clastic morphosedimentary structures also record the maximum extent of Megalake Turkana during the African Humid Period, as well as its subsequent regression forced by the end of the Holocene climatic optimum.
Several hundreds of meters of fluvial-deltaic-lacustrine deposits spanning the Pliocene-Pleistocene are exposed in the Turkana basin thanks to tectonic faulting. These deposits are world famous for their paleontological and archeological content that documents the very early story of Mankind. They also preserve several paleolake high-stand episodes with typical sedimentary facies and structures/bodies reflecting important littoral hydrodynamics distributed from the backshore up to the lower shoreface zones.
As a consequence, this preliminary overview from the Lake Turkana Basin, suggests that littoral hydrodynamics are important processes of erosion, transport an redeposition of clastics in rift lakes, and should thus be considered in the next generation of depositional models.