Toward a consensus for palaeolake Turkana fluctuations during the Plio-Pleistocene : comparative studies of the Nachukui and Shungura Fms (Turkana Depression, Kenya, Ethiopia)

Alexis Nutz*†[1] and Mathieu Schuster*[2]

[1]Centre Européen de Recherche et d'Enseignement des Géosciences de l'Environnement – Institut de Recherche pour le Développement, Aix Marseille Université, Institut National des Sciences de l'Univers, Centre National de la Recherche Scientifique, Institut National de Recherche pour l'Agriculture, l'Alimentation et l'Environnement – France

[2]Institut Terre Environnement Strasbourg – Ecole Nationale du Génie de l'Eau et de l'Environnement de Strasbourg, université de Strasbourg, Institut National des Sciences de l'Univers, Centre National de la Recherche Scientifique – France

Résumé

Reconstructing and understanding the fluctuations of palaeolake Turkana during the Plio-Pleistocene is crucial for geologists, archaeologists, and palaeontologists. Identifying major lake highstands and lowstands over time enables predictive assumptions for basin-scale stratigraphic geometries and sedimentary facies distribution, enhancing our understanding of past environments. Moreover, changes in lake extent are key drivers of faunal dispersal within the Turkana Depression. Indeed, it has been suggested that paleolake highstands acted as barriers to east-west population exchanges, while lowstands facilitated latitudinal migrations. Finally, despite pioneering reconstructions exist, they are discontinuous and need to be reevaluated.

In this presentation, we summarize the results of the RiLakS Project (2014-....), one of those tasks was to reconstruct paleolake Turkana fluctuations since 4 Ma based on the application of sedimentary facies analysis and the principles of sequences stratigraphy. Our work includes detailed sedimentological and stratigraphic analyses of the Nachukui and Shungura Formations. By characterizing depositional environments, identifying stacking patterns, and conducting sequence stratigraphy, we were able to delineate major highstand and lowstand phases. Additionally, we identified several episodes of short-term intense fluvial incision at the basin scale, for which we propose potential causes. Importantly, our study also found no evidence supporting the complete desiccation of paleolake Turkana during the studied interval, questioning previous scenarios.

Finally, this work highlights the value of conventional basin analysis methods in investigating Quaternary continental systems. Drawing from a series of 6 publications since 2016, the RiLakS Project demonstrates the relevance of basin-scale sequence stratigraphy in understanding short-term, dynamic fluvial-lacustrine systems.

*Intervenant

†Auteur correspondant: nutz@cerege.fr

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