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Resolving volcanic from anthropogenic metal input to modern lake Elmenteita, Kenya

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Lake Elmenteita located in the central Kenyan Rift System is a shallow (ca. 1 m deep on average), hyper-saline and alkaline playa lake of international bio-ecological importance, as emphasized by its classification as RAMSAR site (2005) and UNESCO world heritage site of “outstanding universal value” (2011). Unusually high rainfall and anthropogenic influence (deforestation, agriculture, sewage loading) are current drivers of changes in water level, composition and quality as well as the dramatic decline in riparian habitats. Identifying individual sources of both, elemental nutrients (P, N, Mg, Si, Zn) and potentially toxic elements (heavy metals, e.g., Cs, Mo, Pb, Sb, Cu) to the lake is imperative for ecosystem monitorization and development of biodiversity conservation strategies.

Here, we present dissolved element concentrations in water samples collected in July 2022 from the 1) central, 2) northern (discharge of rivers Kariandusi and Mereroni), and 3) southern (dominated by tectonically modulated volcanic hot-springs) part of the lake, as well as from 4) river Mereroni and 5) an additional hot-spring in the eastern part of the catchment. Data was acquired in the field and at the laboratories of the Isotope Geochemistry Group, Tübingen University. Results show compositional differences between hot springs and riverine influx (e.g., **Cs**: 0.03 ng/g Mereroni river vs. 3.3 ng/g S-hot springs), and also between Mereroni river water and northern shore waters (e.g., **Sb**: 0.063 ng/g Mereroni river vs. 0.92 ng/g N-shore; **Cu**: 0.925 ng/g Mereroni river vs. 27.3 ng/g N-Shore). Accompanied by observed compositional heterogeneities within the lake itself, our findings suggest that several sources and processes govern the elemental influx and distribution. Using geochemical indices, we will propose elemental dispersion vectors, main sources, and in-lake processes with the aim to unfolding the impact of recent anthropogenic signals from volcano-tectonic elemental origins to the lake.