DOCTORAL THESIS

Late Quaternary diatom and palynomorph stratigraphies and palaeoenvironments of the Koora Graben and Lake Magadi Basin, Kenya Rift Valley

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A B S T R A C T

Two sets of cores were recovered from the southern Kenya Rift (Koora and Magadi basins) through the Hominid Sites and Paleolakes Drilling Project and the Olorgesailie Drilling Project. These contain a detailed environmental Quaternary history with records of up to ~1 million years. This period correlates with much of the Olorgesailie Formation record of 1.2 Ma in the Olorgesailie Basin. The Magadi cores reached trachyte at ~ 194 and 133 m with this project focussed on the longer core, MAG14-2A, which includes limestone, zeolitic, laminated and massive clay and silt, massive mud, chert, trona, gravel and sand. The Koora Core (OLO12-1A) extended to depths of 166.14 m and contains laminated and massive diatomites, fine to coarse sands; lime and siliciclastic muds with pumice-rich gravels. The two cores are particularly important because they provide environmental records that help to fill erosional gaps in the history of the Olorgesailie Basin, which includes important evidence for changing hominin cultures and evolution.

The high-resolution lacustrine-terrestrial stratigraphies of the two basins have shown how landscapes were transformed because of complex interactions between tectonic and climatic processes. Volcanism also had a significant impact, partially damming lakes at Olorgesailie. Diatoms are present in much of the Koora Basin sequence and large parts of the Magadi sediments. These are dominated by a variety of planktonic *Aulacoseira, Cyclotella* and *Thalassiosira* taxa in both basins. Species comprising these genera and other planktonic, benthonic and epiphytic taxa preserve a detailed record of lakes that fluctuated in depth, extent and chemistry. The data document the presence of freshwater and saline lakes as well as wetlands. Diatom transfer functions from the Koora and Magadi basins indicate that these water bodies fluctuated widely in conductivity between ~200 to >20,000 µS cm^{-1}, with pH changing between about 7.5 and 11.5. The palaeolakes also periodically exceeded diatom tolerance limits and intermittently dried out. Pollen are generally lacking in the Koora basin sediments, but deposits in the Magadi core contain common pollen that document a wide range of habitats, including forests, woodlands and grasslands that could have supported the presence of hominins and their activities in the region. Fungal spore data support pollen inferences and indicate periods when large mammals might have been common.

The microfossil record shows that there was a broad trend towards more arid conditions in the southern Kenya Rift after about 550 Ka, interrupted by periodic wetter conditions. A major episode of desiccation developed between about 500 to 450 Ka and 400 Ka that correlates with a period of mammal extinctions and a change from Acheulean to Middle Stone Age toolkits in the Olorgesailie Basin, suggesting that these changes might have been related to environmental conditions at that time.

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