



Biogeochemistry of Kenyan Rift Valley Lake Sediments

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The numerous lakes in the Kenyan Rift Valley show strong hydrochemical differences due to their varying geologic settings. There are freshwater lakes with a low alkalinity like Lake Naivasha on the one hand and very salt-rich lakes with high pH values like Lake Logipi on the other. It is known that the underlying lake sediments are influenced by the lake chemistry and by the microorganisms in the sediment. The aim of this work is to provide a biogeochemical characterization of the lake sediments and to use these data to identify the mechanisms that control lake chemistry and to reconstruct the biogeochemical evolution of each lake.

The examined rift lakes were Lakes Logipi and Eight in the Suguta Valley, Lakes Baringo and Bogoria south of the valley, as well as Lakes Naivasha, Oloiden, and Sonachi on the Kenyan Dome. The porewater was analysed for different ions and hydrogen sulphide. Additionally, alkalinity and salinity of the lake water were determined as well as the cell numbers in the sediment, using fluorescent microscopy.

The results of the porewater analysis show that the overall chemistry differs considerably between the lakes. In some lakes, concentrations of fluoride, chloride, sulphate, and/or hydrogen sulphide show strong concentration gradients with depth, whereas in other lakes the concentrations show only minor variations. Fluoride is present in all lakes; the lowest concentration is found in Lake Oloiden (60 – 90 mg/l), the highest one in Lake Bogoria (1,025 – 1,930 mg/l). The lakes show also large differences in sulphate concentrations. The values vary between 2 mg/l in Lake Baringo and 15,250 mg/l in Lake Eight. In all cores, sulphate concentration does not change significantly with depth; however, there is a distinct peak in each core, raising the question of synchronicity. As expected, chloride concentrations correlate with total salinity. There is no hydrogen sulphide present in the porewater of Lakes Naivasha, Baringo, and Oloiden, whereas in the other lakes, the hydrogen sulphide concentrations are decreasing with depth.

Although in close proximity to each other, the Kenyan Rift Valley lakes offer the unique opportunity to study a wide range of geochemical environments and the associated biogeochemical processes.