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Tectonic and climate controls on the evolution of rift lakes in the Central Kenya Rift, East Africa

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The one-million-year history of the neighboring Nakuru-Elmenteita and Naivasha lake basins in the Central Kenya Rift illustrates the relative importance of tectonic vs. climatic influences on rift lake evolution. Although the modern climate conditions in both basins are very similar, hydrology and hydrochemistry of Lakes Nakuru-Elmenteita and Naivasha exhibits dramatic differences that are mainly attributed to tectonically controlled differences in the basin geometries and drainage networks. In this study, we use eighteen 14C and 40Ar/39Ar dated sediment sections to study the evolution of both lake basins in the course of tectonic and climatic influences. Trends and events in the history of both lake basins were reconstructed from fossil diatom assemblages contained in these sediments. The comparison of the diatom record clearly indicates that tectonically induced differences in the basin geometry and drainage network vanished during extreme wet periods, such as during the Early Holocene climate optimum. Stronger coupling of basins hydrology through surface and subsurface water exchange is one possible explanation of weaker tectonic influences. These results have important implications for the interpretation of lake sediments as climate archives in tectonically active regions.