



Sensitivity of the East African rift lakes to climate variability

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Lakes in the East African Rift have provided excellent proxies to reconstruct past climate changes in the low latitudes. The lakes occupy volcano-tectonic depressions with highly variable climate and hydrological setting, that present a good opportunity to study the climatic and hydrogeological influences on the lake water budget. Previous studies have used lake floor sediments to establish the sensitivity of the East African rift lakes. This study focuses on geomorphology and climate to offer additional or alternative record of lake history that are key to quantifying sensitivity of these lakes as archives to external and internal climatic forcings. By using the published Holocene lake areas and levels, we analyze twelve lakes on the eastern arm of the East African rift; Ziway, Awassa, Turkana, Suguta, Baringo, Nakuru, Elmenteita, Naivasha, Natron, Manyara and compare with Lake Victoria, that occupies the plateau between the east and the western arms of the rift. Using the SRTM data, Hypsometric (area-altitude) analysis has been used to compare the lake basins between latitude 80 North and 30 South. The mean elevation for the lakes, is between 524 and 2262 meters above sea level, the lakes' hypsometric integrals (HI), a measure of landmass volume above the reference plane, vary from 0.31 to 0.76.

The aridity index (Ai), defined as Precipitation/ Evapotranspiration, quantifies the water available to a lake, it encompasses land cover and climatic effects. It is lowest (arid) in the basin between the Ethiopian rift and the Kenyan rift and at the southern termination of the Kenyan Rift in the catchments of lake Turkana, Suguta, Baringo and Manyara with values of 0.55, 0.43, 0.43 and 0.5 respectively. And it is highest (wet) in the catchments of, Ziway, Awassa, Nakuru and Naivasha as 1.33, 1.03 and 1.2 respectively, which occupy the highest points of the rift. Lake Victoria has an index of 1.42 the highest of these lakes and receives a high precipitation.

We use a simple model written on a Matlab code to illustrate the lake volume and area response to climate of surficially closed, graben shaped and panshaped lake basins. From preliminary results, lake basins that are sensitive to climate variability have a high HI and high aridity index, which will be presented in this conference