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Non-climatic lake level changes in the Main Ethiopian Rift

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East Africa is a region of extremely complex meteorological and climatological phenomena and coupling-mechanisms, possibly one of the most complicated of the continent. Conditions in Ethiopia are exemplary for the modification of general global circulation patterns on regional scale triggered by morphology, large water bodies or maritime neighbourhood even over very short distances. The main topographic feature, generated by continental rifting, the central Ethiopian highland, ranges from 1500 to 3000 m a.s.l. The high plateau is sharply cut by the 48 to 64 km wide East African Rift and is surrounded by lowlands of 1500 m a.s.l. height and below. The influences of the general atmospheric circulation and monsoon effects are predominant but climate on microscale can vary significantly within tens of kilometres. Since closed catchment basins are susceptible to local variations in evaporation and precipitation, the interpretation of past lake levels is a common method to assess prehistoric regional fluctuations in climate. A continuous monitoring of the Earth's surface with high resolution civil satellites since 1972 enables us to get a quick overview about recent lake level changes. Measurements of lake surface areas proved to be a useful tool to observe changes in the water balance of a lake's catchment area, either due to climatic oscillation, modified land use practices or even neotectonic effects. For example we used multi-temporal Landsat data (180-054,168-054: 1973, 1986, 1989, 2000, 2001, 2002) along with a digital terrain model of the lake floor to quantify the expansion of Lake Beseka in the northern Main Ethiopian Rift. Despite the aridity of the rift valley the lake's surface area quadrupled from 11.1 km2 in 1973 to 39.5 km2 in 2002. We could show that an approach based on both in-situ measurements and remote sensing data is useful to quantify changes in lake extension over time. The methods described

in this study also turned out to be a convenient tools to obtain a better understanding of potential causes for lake level rise. Our study confirms that Lake Beseka's recent growth is not influenced by local or global climatic changes but most probably by morpho-tectonic processes. Several other lakes are now being investigated with similar methodologies.