



## **Sensitivity of Lake Ihotry (SW Madagascar) to climate change: hydrological modeling and diatom-inferred long-term evolution.**

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Lake Ihotry is a closed saline lake extending in the semi-arid southwestern part of the Madagascar Island. The lake encounters large seasonal and inter-annual variations in area and salinity, but a 4000 years-sediment core showed that hydrological fluctuations of much larger magnitude have occurred in the past. Monitoring of lake level and chemistry, rainfall and pan evaporation close to the lake, conducted over more than two years, was used to establish the present-day lake water balance and to calibrate a lake level and chloride content model at a daily time step. In the sediment core, diatom data document a wet episode with freshwater conditions from ca. 3300 to 2550-2000 cal. yr, indicating an open lake. This episode was followed by a desiccation trend punctuated by large variations of diatom-inferred salinity between ca. 2250 and 1350 cal. yr, and finally the onset towards modern conditions by 700-650 cal. yr. A digital elevation model enabled to quantitatively reconstruct the morphometric parameters of an open lake, with an outflow sill about 13m above the present-day average level. These lake area-depth-volume relationships were used in the combined water and chloride balances model to investigate conditions of the freshwater lake, to reconstruct short-term oscillations of diatom-inferred salinity, and to simulate the lake evolution towards its present-day state. We conclude that the regional water table evolution was an important factor controlling the long-term lake evolution, through its successive connection/disconnection to the lake.