Geophysical Research Abstracts
Vol. 20, EGU2018-8516, 2018
EGU General Assembly 2018
© Author(s) 2018. CC Attribution 4.0 license.

Formation of Lake Victoria during coeval rifting in East Africa: a 3-D thermomechanical modeling approach

Henry Wichura (1), Javier Quinteros (2), Wolfgang Schwanghart (1), Sascha Brune (2), Daniel Melnick (3), and Manfred R. Strecker (1)

(1) Potsdam University, Institute of Earth and Environmental Sciences, Potsdam, Germany, (2) Helmholtz Centre Potsdam, GFZ German Research Centre for Geosciences, (3) Austral University of Chile, Institute of Geosciences

Recent geodynamic, sedimentologic, and thermochronologic studies in the Cenozoic East African Rift System (EARS) support the notion of a broadly contemporaneous onset of normal faulting, rift-basin formation, and rift-flank uplift in the eastern and western branches of this extensional province. Based on these observations and plate-kinematic characteristics, we explore the evolution of Lake Victoria, Africa's areally most extensive lake. Lake Victoria is located in the interior of the East African Plateau (EAP), above thick, unfaulted lithosphere of the Tanzania Craton, between the eastern and western branches of the EARS. We use a 3-D thermomechanical model to reproduce the flexural response to stretching of variably thick lithosphere in this region and assess the topographic change in the EAP forced by extension driven by plate-kinematics. We demonstrate that elevation differences of up to 180 m between the EAP interior and adjacent rift shoulders suffice to generate severed regional drainage conditions 6.5 Ma after the onset of extension. This may have initially favored the formation of small sub-basins in the plateau interior, which were superseded by the establishment of Lake Victoria. Our model illustrates how strain concentration in the rheologically weak Proterozoic mobile belts that straddle the margins of the stable Tanzania Craton may have facilitated lacustrine basin development, sediment routing, and speciation.