Geophysical Research Abstracts,
Vol. 10, EGU2008-A-12313, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-12313
EGU General Assembly 2008

Oblique rifting and en échelon-segmentation of the northern Kenya Rift

M.R. Strecker (1), D. Melnick (1), A. Deino (2), M.H. Trauth (1), D. Olago (3), Y. Garcin (1)

(1) Institut f. Geowissenschaften, Universität Potsdam, Potsdam, Germany, (2) Berkeley Geochronology Center, Berkeley, U.S.A., (3) Dept. of Geology, University of Nairobi, Nairobi, Kenya

The Kenya Rift is one of the most spectacular topographic expressions of active continental extension with a length of about 500 km, a width of 60-80 km, and an average cross-sectional relief of more than 1000 m. The Kenya Rift comprises the Southern, central and northern sectors. For most of the structural evolution of the central Kenya Rift faulting has been controlled by an E-W oriented position of Shmin. However, fault kinematic data, orientations of eruptive centers and dyke systems, borehole breakouts, and earthquake focal-mechanisms document that the extension direction has rotated to its neotectonic NW-SE to WNW-ESE orientation during the Pleistocene. The new extension direction is now oblique with respect to previously generated structures, resulting in oblique normal faulting at the rift margins and a new left-stepping pattern of young zones of extension in the central Kenya rifts. The NNE striking normal fault zones bound smaller sub-basins within the larger rift basin. The kinematic transfer between these structures is either accomplished by closely spaced normal faults or obliquely striking fault zones with combined strike-slip and normal faulting. An identical situation exists in the NNE oriented northern Kenya Rift, although the fault systems are right-stepping. The arid Suguta Valley provides excellent exposure of these Quaternary faults. Numerous active normal faults occur in the central, axial sector of the Suguta Valley and cut volcanic flows, fluvial and lacustrine units. These structures coexist with, and are intrinsically related to young volcanic activity along the volcano-tectonic axis. Inspection of ASTER satellite imagery and our field surveys

reveal that these active faults constitute a systematic segmentation pattern that forms a right-stepping en échelon pattern. This pattern originates on the flanks of the main volcanic edifices of the region, similar to the situation in the central Kenya Rift. These volcanic edifices are the Silali, Emuruangogolak, Namarunu, and Barrier volcanoes. This close arrangement of eruptive centers and young zones of extension is similar to sectors of the Ethiopian Rift, suggesting that the observed pattern is the result of a NW-SE orientation of Shmin.. The Kenya Rift may thus have attained an advanced stage of rifting that may ultimately evolve into an extensional zone such as the punctiform spreading centers in the Red Sea.