AAPG Annual Convention
Salt Lake City, Utah
May 11-14, 2003

Jonathan P. Dunningham, John R. Underhill, and J. Barry Dawson, Edinburgh University, Edinburgh, United Kingdom

Long-Term Evolution of Normal Fault Systems: Controls on the Development and Evolution of Extensional Structures in the Neotectonic Kenyan Rift, East Africa

Understanding the processes of extensional fault growth and interaction is key to determining the mechanisms that control rift development. At present there is an important gap in knowledge as to the rate of fault growth and propagation during the earliest phase of basin evolution. In many ways this time period is fundamental to our understanding of rift development because it may represent the transitional phase, predicted in some numerical models, between early, diffuse, fault networks and mature rift settings that are dominated by a few large faults. A well-exposed extensional fault array around Lake Magadi, in the Southern Kenya Rift, East Africa, cuts through a number of volcanic lavas that cover the Rift Valley floor and in many regions were erupted contemporaneously with faulting. Such regions are characterised by backtilted extensional footwall blocks and horst blocks that are onlapped by tilted lava flows that vary in thickness along the strike of the fault. These lavas are primarily trachytes and basalts that, significantly, can be dated as ~0.4-2.0Ma through the use of $^{40}Ar/^{39}Ar$ radiometric determinations.

Differential GPS and conventional mapping have been used to survey both the overall displacement-length profiles of a number of the footwall scarps and the flow thickness changes along the length of the scarps. Rotation of GPS points recorded along the upper surface of each onlapping flow back to the horizontal allows a reconstruction of scarp morphology at the time of lava eruption. These features bear a striking similarity to syn-rift sedimentary features generated within extensional basins.

Copyright © 2003 by AAPG