Active tectonics in the western branch of the East African Rift System

Damien Delvaux[1,2], François Kervyn[1], Jean-Luc Mulumba[3], M. Louis Kipata [3], M.N. Sebagenzi[3], Georges T. Mavonga[4], Athanas S. Macheyeki[5], Elly Bryan Temu[5]

[1] Royal museum for Central Africa, B-3080 Tervuren, Belgium, damien.delvaux@africamuseum.be
[2]School of Geosciences, University of the Witwatersrand, Johannesburg, 2050 Wits, South Africa
[3] Department of Geology, University of Lubumbashi, Katanga, Democratic Republic of the Congo
[4]Goma Volcanic Observatory, Goma, North Kivu, Democratic Republic of the Congo
[5] Geological Survey of Tanzania, P. O. Box 903, Dodoma, Tanzania

The western branch of the East African rift system is known for its particular seismic activity with larger magnitude (up to Ms 7.3) and more frequent destructive earthquakes than those in the eastern branch. As a contribution to the IGCP 601 project Seismotectonic Map of Africa, we compiled the known active faults, thermal springs and historical seismicity in Central Africa. Using the rich archives of the Royal Museum for Central Africa, publications and own field observations, we present a compilation of available data relative to the current seismotectonic activity along the western branch of the East African rift system, in DRC, Rwanda, Burundi and Tanzania. Neotectonic activity related to the western rift branch is in general well expressed and relatively well studied in the eastern flank of this rift branch, in Uganda, Rwanda, Burundi and Tanzania. In contrast, the western flank of this rift branch, largely exposed in the DRC, has attracted less attention. Data collected during the colonial times show significant sismotectonic activity in East DRC, not only in the western flank of the western rift branch, but also extending far westwards up to the margin of the Congo basin. In particular, our predecessors paid a special attention to the mapping and description of thermal springs, noticing that they are often controlled by active faults. In addition, the operators of the relatively dense network of meteorological stations installed in the DRC, Rwanda and Burundi recorded variable level of completeness and detail the earthquakes that they felt. Compilation of these data provides a rich database that can be used to the existing knowledge on historical seismicity. The identification and mapping of potentially active faults remains however difficult in eastern DRC, due to poor field accessibility, tropical climate weathering and vegetation coverage. For the entire western rift branch, the compilation of active fault data is hampered by the fact that very few faults have been investigated by paleoseismic trenching. Therefore, such compilation will highlight the pattern of neotectonic faults (those faults that have been active since the onset of the last and currently active tectonic stage) rather than those of active faults (with proven activity during the last 10 Ka). The first- and second-order stress field of this region is relatively well known stress inversion of earthquake focal mechanisms, but the more detailed stress field related to the interaction of fault segments has still to be defined.