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Earthquake geology of the Kanda fault system (Tanganyika-Rukwa rift, SW highlands of Tanzania)

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The 160 km-long Kanda normal fault system is running longitudinally across the Ufipa tilted horst between the Tanganyika and Rukwa rift basins in the western branch of the East African Rift System. It is likely to have been affected the Ms 7.4 earthquake in 1910 whose instrumental epicentre was located approximately near Sumbawanga town, along the northern portion of the fault. Remote sensing, morphotectonic, and palaeoseismological investigations together with structural geology and electric resistivity profiling allow to characterise the main seismological parameters of this major active fault.

In order to reconstruct the along-trend displacement profile and fault segmentation, topographic profiles were made across the fault scarp using data from differential GPS, Hand GPS and the 90 m resolution STRM DEM. Comparison of topographic profiles from the same site using the different topographic data provides some insight on the methodology and validity of topographic profiles extraction. Due to the large dimensions of the fault scarp (10-30 m high) the strong magnitude of the potential earthquakes (Ms. 7.5) and the large associated co-seismic slip (2-4 m), classical paleoseismic trenching is difficult to apply. Instead, we used existing exposures such as natural trenches, road cuts and outcrops, supplemented by a dense topographic survey (5000 points on differential GPS over less than 1 km2) to produce a 2 m resolution digital elevation model, performed detailed geological mapping, airphoto interpretation, electric resistivity profiling, small drillings, and C14 dating. Efforts were concentrated on a promising site where river sediments and peat deposits are interbedded with vol-

canic tephra layers and largely exposed on the footwall. Results show that the Kanda fault had different cycles of activity, separated by tectonically quite periods. The last period of activity probably started by 11 cal Ka BP, soon after the deposition of a marked tephra layer, but sedimentation on the footwall continued up to 5 Ka cal BP. Since then, the minimum offset is estimated at 17.9 m, which gives a minimum slip rate of 3.58 mm/year, of an equivalent of one earthquakes generating 3.58 m slip per 1000 years (Ms in the range of 7.0 - 7.5).