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Soft-sediments deformation structures of the Niger River right bank alluviums at Bamako, Mali, and their paleoseismic significance



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The west African craton, within which Bamako, capital city of the Republic of Mali is located is generally believed to be an aseismic region characterized by low seismic risks. The recent discovery of seismites, deformations of unconsolidated sediments on the deposits of the Niger River, the biggest river of West Africa, challenges this belief. The Niger River crosses Bamako E-W. It made its course through the main geological formations of the region: the crystalline basement, the Paleozoic Sotuba and Koulouba Sandstone formations. At the eastern edge of the city, the Niger River crosses the dolerite sill of Sotuba known as the Sotuba rapids, that has been a natural dam along the course of the River enabling it to deposit more than 30 meters of a thinly laminated mud covered by 0.25 meters of a dark sand layer, topped by a quartzite pebble layer of 2 meters. These alluviums embody numerous deformation structures composed of a clastic dike of 80 centimeters wide and more than 400 meters long from the outcrops in a 336° NW direction, soft-sediments folds, syndimentary joints, normal and reverse microfaults, dish structure etc. developed on the mud layer. The presence of such structures implicates an important seismic activity, as an earthquake of magnitude at least of Mw=5 is necessary to trigger them. The comparison of grain size and heavy mineral analysis between the mud layer and the clastic dike testify that the later was intruded instantaneously. As the region is far from the major plate margins and subduction zones, the earthquake that triggered the structures should certainly be related to the numerous faults that the rivers crosses near the Sotuba rapids.



Figure 2: microfaults in laminated sediments.



Figure 1: clastic dike crosscutting the laminated silts.

Figure 3: main faults visible in the area.

