ACTIVE FAULT IN KHERRATA

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ABSTRACT

Kherrata Fault, also called Kherrata fold-fault (Roth, 1950) is located in the mountains of Babors at Kherrata (NE Algeria), it marks the beginning of the plain. It is oriented NE-SW fault whith north dipping. This fracture between two topographically and geologically distinct regions, with the folded limestone north Babors and dumped in the south of the country where the marl hills Senonian is almost horizontal. According to Rothé (1950), this fault is responsible for the earthquake in 1949. Besides Kherrata. Gabert (1984) believed that the creation of volumes in the mountainous region Kherrata is recent and may still be in progress during seismic events. Indeed, the Babors region has experienced several earthquakes in recent decades, the latest being that of Laalam in 2006. The geological and tectonic study in this work has shown evidences of neotectonic activity on this fault and Geophysical Electric Imaging contributed greatly to the knowledge of this active fault geometry. This work will further the understanding of seismotectonic model of North Algeria.

INTRODUCTION

The valleys are often located along major faults, the rocks are being weakened and more vulnerable to erosion. Rivers therefore generally follow those areas of weakness. This is the case of the valley where the Kherrata fault follows the west side of the valley in which grow quaternary terraces, already reported by Gabert (1984). Quaternary Kherrata Fault is a bit south of the break in slope between the Jebel Amar Redou (fig. 1) of the valley. This can be explained by the creation of new branches, same in Machane et al. (2008), which generate, the main flaw. However, field work, show a fault with a striated plan outlining all directions, since those strike-slip to those with pitches of 90 °. The recent game this flaw does not seem to express the surface, and it is probably a blind fault. Besides, Rothe (1950) who showed for the first time, talks about fold-fault, like the fold-fault Sahel highlighted by Meghraoui (1988). This structure Kherrata would be a of neotectonic displacement inherited from the ante-Neogene accidents. At Jebel Takoucht, rupture length of over a kilometer affects its northern flank.

Kherrata fault also called Kherrata fold-fault (Rothé, 1950) is in the Babors mountains at Kherrata (fig. 2), it marks the beginning of the plain. It is a NE-SW plunging northward fault. This fault has a dip steeply to the north at this point, showed streaks vertical pitch (90 °).

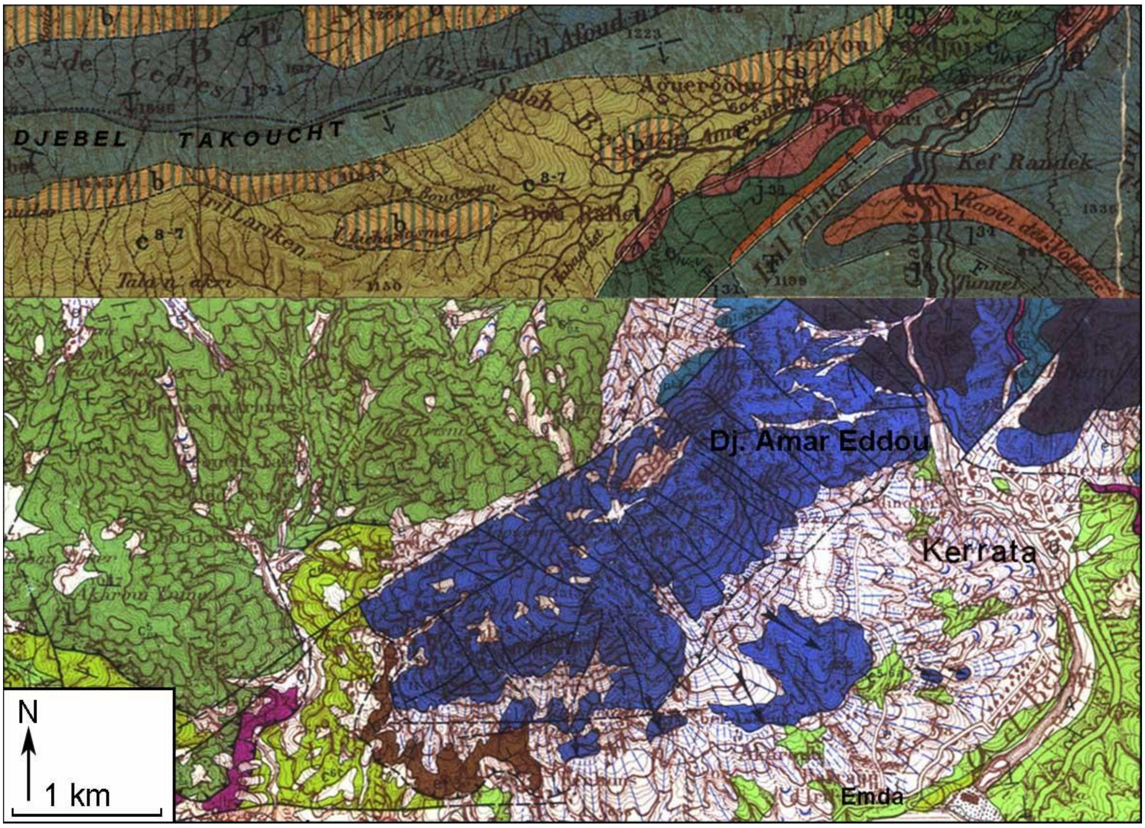

Figure 1. Geology of Kherrata showing Jebel Takoucht and the the Jebel Amar Eddou South fault and Emda dam (Ehrmann, 1925)

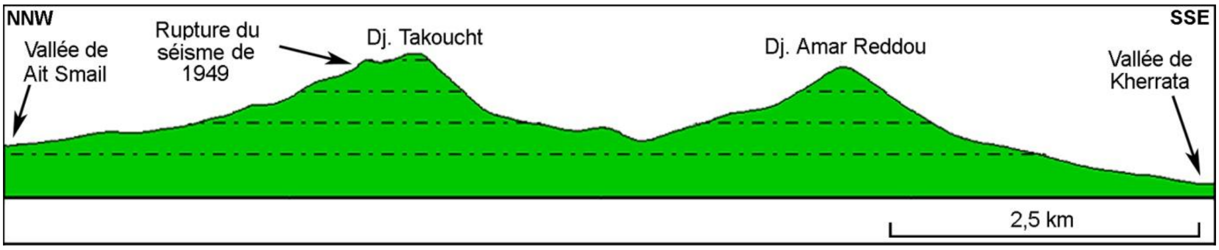

Figure 2. Topographic profile through the Jebel Takoucht, Jebel Amar and Reddou Valley Kherata.

GEOLOGICAL ANALYSIS

According to Rothe (1950), this fault is responsible of 1949 Kherrata earthquake (Gabert, 1984) that believes that the creation of volumes in the mountainous region Kherrata is recent and may still be in progress during seismic events . Indeed, the region has experienced several earthquakes in Babors recent decades. After Our field surveys in the Kherrata region (fig. 3), we were able to find evidence of recent tectonic deformation. Indeed, at the Kherrata sandstone, training conglomeratic recent show dips to the south at about 30 °. A more recent layered formation, which is probably the recent Quaternary, which also shows the same dip to the south, but with a slightly higher value.

Figure 3. Kherrata Fault at Jebel Amar Reddou. We see very clearly in the picture streaks near the vertical of the overall ENE-WSW oriented fault.

The subsidence areas (swamp or pond fill dam lake) often mark depressions located in contact with the fault zone in which are usually trapped sediment. The Emda dam Kherrata (Fig. 4) is a good example of collapsing zone located near the active fault Kherrata. Indeed, the term "Emda" (or even Temda) in Berber langage serve a wadi depression for water accumulation. Given the location of Jebel Amar Redou and position of the valley from these babors mountains located in the North, this flaw could have only dipping to the north as it was reported on the withdrawn interpretative Kherrata geological cross section (Fig. 5).

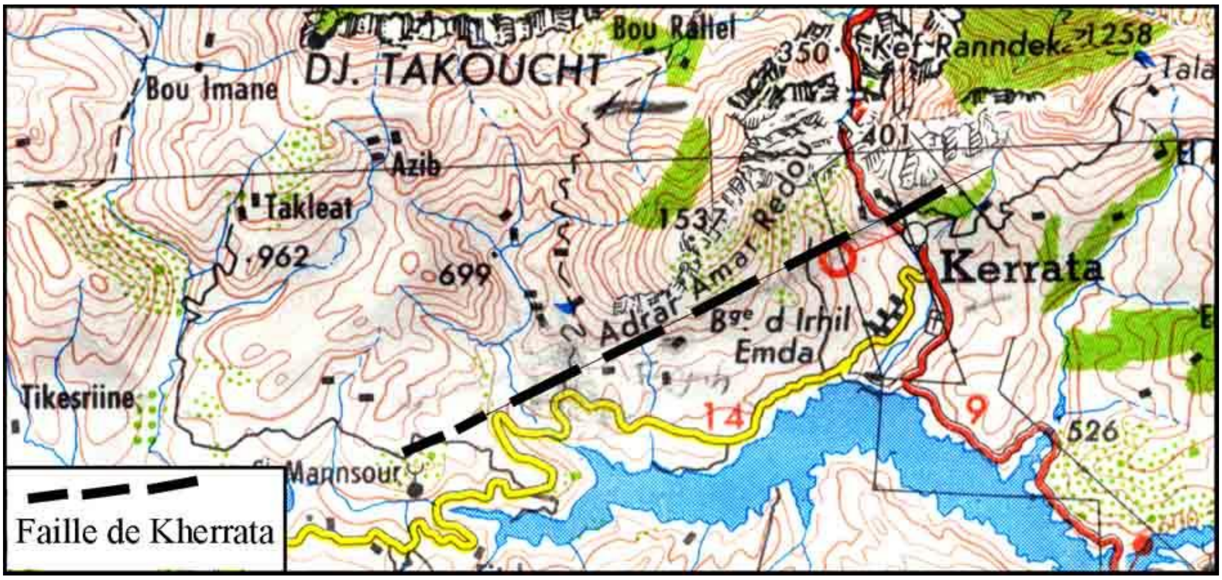

Figure 4. Kherrata Valley alignment in the western part, parallel to the Kherrata fault trace of. It is in this section that are developing Quaternary terraces staggered Kherrata

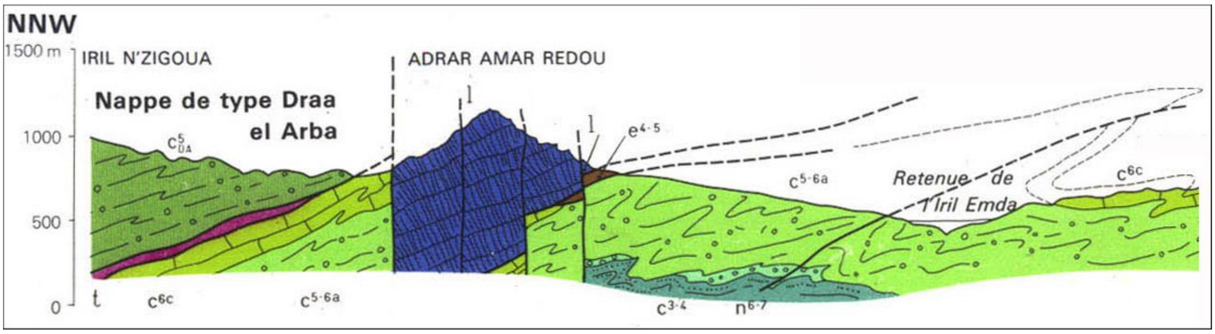

Figure 5.Iinterpretative cross section through Jebel Amar Reddou and Emda valley and showing the north dipping fault at the Iril Emda (from the geological map 1:50 000 Kherrata, Kazi-Tani, 1977).

GEOPHYSICAL RESULTS

To know the fault geometry at depth, we conducted a geophysical profile of electrical imaging perpendicular to the flaw in the place indicated by Rothé (1950).

The profile has 33 electrodes with an inter-electrode spacing of 6 meters, it was installed at the Kherrata region in the foothills of Jebel Amar Reddou showing a large fault scarp. Resistivity section (Fig. 6), obtained after treatment shows a very large resistivity contrasts with a lateral variation from 100 to 6000 ohm.m.

The geoelectric profile made perpendicular to the Kherrata fault presents a contrast showing a very local drop in the electrical resistivity values (fig. 6), just at the break of slope. The separation plane (at the break in slope) of these two values of electrical resistivity shows a north dip with a high value of embedding surface and weakens at depth. This separation is on the ground segment of the Kherrata fault passing the foothills of Jebel Amar Reddou.

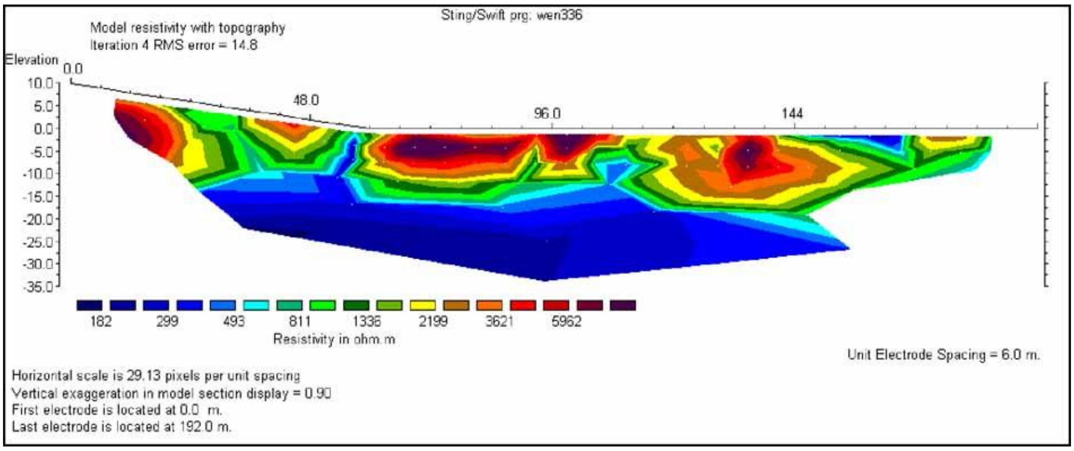

Figure 6. Perpendicular geophysical profile of the fault Kherrata near Amar Reddou

CONCLUSION

This geological prospecting field work demonstrates again the importance of geological investigations in site, through the demonstration of tectonic deformation indices. Indeed, the neotectonic deformation contributed greatly in the analysis of the recent activity of the Kherrata fault. Geophysics was invaluable tool that allowed us to get a better idea of the geometry of this fault at deep.

We suggest that the fold-fault highlighted further south is the active branch of the fault Kherrata highlighted further north by Rothe (1950). This branch we see as responsible for the earthquake of 1949, would take turns towards the so-called Kherrata fault of Rothé. The maximum credible earthquake for this fault is Mw = 7.3. This study demonstrates the interest of the geological study in the context of prevention related to the earthquake engineering.

This work is also a good contribution in establishing the north algerian seismotectonic model, which still needs to be updated and completed.

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