

THE BOUGUIRAT EARTHQUAKE (MOSTAGANEM 05/22/2014) NORTHWESTERN OF ALGERIA

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On May 22, 2014 an earthquake of magnitude 5.2 ML (CRRAG) occurred at Bouguirat (Northwest Algeria) and its surroundings. This moderate seismic event was located in a region characterized by low seismic activity where few historical events have been observed. This earthquake showed a maximum intensity of VIII on the MSK scale and caused serious damage, especially in the village of Legouatine located 2km south of the town of Bouguirat. In the epicentral region, 1987 homes and eight public buildings were damaged in urban as well as 2,300 homes in rural areas. Several surface ruptures were observed in the field, all have been linked to shifts in gravity fields along slopes. The focal Mechanisms revealed by international institutions GFZ and ING immediately after the earthquake show solutions reverse fault trending NE-SW, which is consistent with the focal mechanisms nearby earthquakes and the regional tectonic setting of confrontation African-Europe. The tectonic structure responsible of this earthquake would be a blind fault dipping SE associated with an anticline located 4km north-west of the city of Bouguirat. It would be a continuation of the faults that surround the chain of Dahra (chain of Algerian NW). Chain folds where the plateau of Mostaganem (including the folding of NW Bouguirat) can be considered as its western extremity.

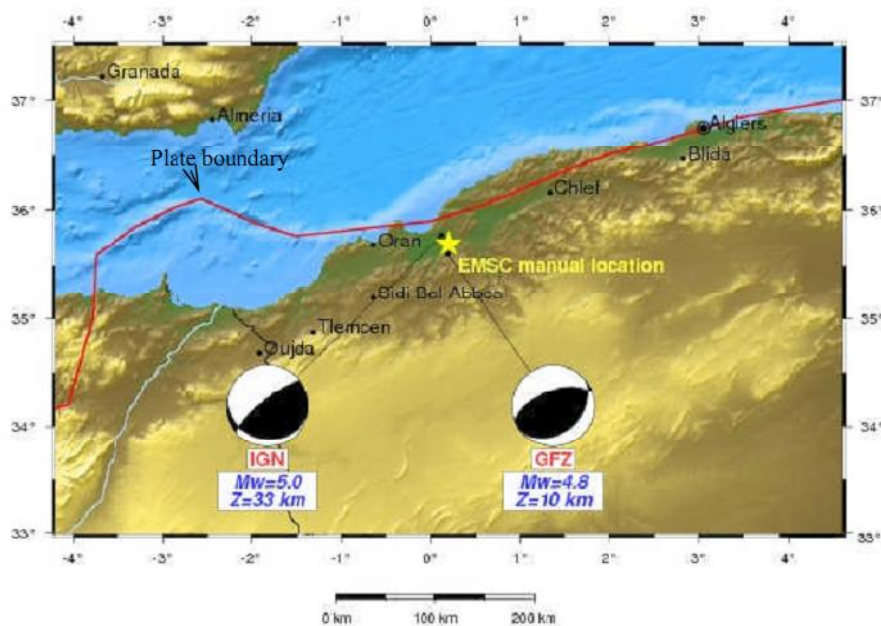


Figure 1. Focal mechanisms by IGN and GFZ institutions (EMSC manual location)

The spatial variability between the intensity and damage caused by this earthquake, and the wide gap between its magnitude $M_L = 5.2$ and the intensity observed in the field (VIII on the MSK scale) are to be connected to topographic conditions and by the seismic amplification effects. Indeed, the most affected area with the maximum intensity of VIII is at Douar Legouatine, located atop of crest topographically highest (274m high) consisting of an anticlinal fold trending NE-SW elongate over 10Km long and less than 2 Km wide. Bouguirat Area (70m high), yet closer to the epicenter, showed a lower intensity of about VI. These observations on buildings in the same class of vulnerability EMS98 show that masonry houses of vulnerability class A and B have suffered at the village almost total destruction in a preferred direction, perpendicular to the extension of relief, then the same type of construction at the bottom of the ridge only show some cracks which correspond to an intensity level of VI EMS98. A comparison of the cumulative damage along the crest showed a significant topographic site effect in Legouatine



Figure 2. a) Tilt and Detachment of the wall undergoing the out-plane deformation due to roof collapse in Douar Legouatine the wall undergoing the in-plane deformation shows a deep crack perpendicular. b) The presence of diaphragm in this house has prevented the collapse of the wall undergoing the out-plane deformation, but the rupture of the diaphragm, shown in this photo, has caused a detachment and an inclination of the wall. c) The collapse of walls is perpendicular to the slope of the crest

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