THE GEOLOGICAL EVIDENCES ASSOCIATED TO BOUMERDES EARTHQUAKE IN ALGIERS AREA

Nadia SIDI SAID
Researcher, National Center of Applied Research in Earthquake Engineering (CGS), Algiers, Algeria
nadsidisaid@yahoo.fr

Keywords: Earthquake, Boumerdes, Reverse Fault, Tectonic, Miocene

The earthquake in Boumerdes has demonstrated the activity of the Zemmouri Fault, located between Dellys and Boudouaou El Bahri, trending NE-SW. The various studies (Meghraoui et al., 2004; Bounif et al., 2004; Ayadi et al., 2008) indicate a fault plane with 55 km length, oblique to the coast, trending NE-SW and dips to the SE. The activity of this reverse fault with an epicenter near the coast has led to a remarkably important coastal coseismic uplift of about 50 km, visible on the coast. This flaw was already assumed by various authors who have worked in the region, especially because of its morphology staircase that shows several marine terraces at different altitudes. Therefore, the field investigation was oriented exclusively along the coast of this region to search for clues in the activity of this fault.

The Boumerdes region encompasses two distinct geological units, indigenous lands and non-native land. This diversity in native and non-native confirms the structural and tectonic complexity characteristic of our study area, which is caused by several phases of deformation. The photogeological analysis was performed from the study of aerial photographs at the scale of 1/40000. The analysis gives a stereoscopic vision of relief on aerial photographs, which can be used to recognize lineaments easily (more or less).

All the lineaments were counted according to their orientation relative to the geographic North. These data were pooled and projected so bring in the form of frequency diagrams and easily readable. These are commonly called rosettes direction. The frequency diagram of the directions is quantitative as it records only the number of incoming lineaments respectively in different intervals. Such a diagram cannot be used to make any difference between major lineaments stretching for several kilometers and small lineaments that their length does not exceed a few hundred meters.

The objective of this analysis is highlighting tectonic lineaments with multi-kilometers length which can be verified in the field and the implementing structural analysis of major lineaments identified. In addition, the superposition of the lineament map obtained with the geological background allows interpretation of the distribution of lineaments based on major geological region. The most important lineaments are those that affect the Neogene and Quaternary geological units.

Lineaments identified on aerial photographs and shown the lineament map, are grouped according to their directions relative to true north in classes at a pitch of 10 degrees. These directional classes are then projected on a diagram allowing to highlight the preferred directions. From this directional rosette, the most important lineaments in this particular study area can be identified. It appears from reading the rosette steering preferential classes.

Statistical analysis of directional rosettes shows that lineaments in the study area are oriented generally along four main directions of:

- Direction: Northwest / Southeast and Northeast / Southwest
- Direction: North-South
- Direction: East-West

In the southern part of the city in Boumerdes, earthworks highlighted tectonic synsedimentary complex in red Quaternary deposits probably Villafranchien. These flaws sealed for most UHF metric. They have a reverse direction resulting from a compression movement. Most of these faults are oriented NE-SW and some show a NW-SE direction. These multiple faults can be synchronous (same age). They form high zones similar to small horst and subsidence zones forming grabens. In some cases, these flaws can be diachronous (relatively different ages).

REFERENCES

Ayadi A, Dorbath C, Ousadou F, Maouche S, Chikh M, Bounif M and Meghraoui M (2008) Zemmouri earthquake rupture zone (Mw 6.8, Algeria): aftershocks sequence relocation and 3D velocity model. Journal of Geophysical Research 113, B09301, http://dx.doi.org/10.1029/2007JB005257

Bounif ., Dorbath C, Ayadi A, Meghraoui M, Beldjoudi H, Laouami N, Frogneux M, Slimani A, Alasset PJ, Kharroubi A, Ousadou F, Chikh M, Harbi A, Larbes S, and Maouche S (2004) The 21 May 2003 Zemmouri (Algeria) earthquake Mw 6.8: Relocation and aftershock sequence analysis. Geophysical Research Letters, VOL. 31, L19606, doi:10.1029/2004GL020586

Meghraoui M, Maouche , Chemaa B, Cakir Z, Aoudia A, Harbi A, Alasset PJ, Ayad A, Bouhadad Y and Benhamoud F (2004) Coastal uplift and thrust faulting associated with the Mw=6.8 Zemmouri (Algeria) earthquake of 21 May 2003. G.R.L., vol 31, L19605, doi:10.1029/2004GL020466