



SPECTRAL SOURCE PARAMETERS OF THE 22 FEBRUARY 2014, Md4.5, EARTHQUAKE NEAR ZEMMOURI-BOUMERDES, ALGERIA

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The capital Algiers and its surroundings have a history of destructive earthquakes. In the last century and more recently, some moderate to strong earthquakes occurred in this region. The strongest event was the 2003, Mw6.9, Zemmouri-Boumerdes earthquake 50 km east of the capital. Since this region is known to present diverse active faults, it is essential to study moderate and small earthquakes to detect more active faults in the region for the purpose of updating the seismic hazard map.

An earthquake, of magnitude Md4.5, occurred 12 km south east of the epicenter of the 2003 Zemmouri-Boumerdes earthquake on 22 February 2014. This event was well recorded by 15 seismological stations of the ADSN (Algerian Digital Seismic Network) that are located between 26 and 293 km from the epicenter. The epicenter of this event is located at 36.76°N latitude and 03.77°E longitude and 11 km depth. The RMS and the horizontal and vertical errors are respectively 0.12 s, 0.95 km and 1.62 km. The epicenter is located 5 km NE of Bordj-Menaiel city and 5 km NW of Naciria city. No aftershocks have been recorded. The focal mechanism shows a near vertical E-W right-lateral strike-slip fault plane under regional NW-SE tectonic compression. This fault plane solution is consistent with the topographic lineament observed between the localities of Bordj-Menaiel and Naciria, on aerial photography and other satellite images. The geological structure related to the topographic lineament is parallel to the Thenia fault, a vertical fault perpendicular to the 2003 Zemmouri-Boumerdes thrust fault. The Thenia fault is thought to play a role in the rupture arrest during the 2003 earthquake. Furthermore, this 2014 earthquake was also the occasion to point out remarkable site amplification in Douéra site, built near an embankment dam close to Algiers. The maximum intensity of the event was estimated as VI by CSEM on the EMS98 scale in Tizi-Ouzou 25 km SE of the epicenter. As the study of earthquake source-parameters and faulting of small earthquakes helps to scale earthquake sizes and stress drops, the dynamic source parameters of this 2014 event were estimated from P-wave displacement spectra using broadband stations of ADSN. The corner frequencies range from 0.8 to 2.2 Hz. The source dimensions range from 604 to 2868 m, the seismic moments from 7.6×10^{14} to 5.1×10^{15} Nm (Mw=3.9-4.4), the stress drops from 0.14 to 22.7 bar and the average displacement is a little bit more than 3 cm. In general, the relationship between the stress drop and the seismic moment indicates a decrease in the stress drop with decreasing seismic moment. Moreover, a moderate directivity effect to the east is observed on horizontal broadband records.

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