Source characteristics and tectonic context of the 2023 (Mw4.9) La Laigne earthquake, France

Mickaël Bonnin*[1,2], Clément Perrin*[1,2], Marion Alloncle*[2], Céline Hourcade[2], Damien Fligiel[1], Eric Beucler[1,2], and Seismological Community Epos-France

[1]Observatoire des Sciences de l'Univers Nantes Atlantiques – Université d'Angers, Institut National des Sciences de l'Univers, Conservatoire National des Arts et Métiers [CNAM], Centre National de la Recherche Scientifique : UAR3281, IMT Atlantique Bretagne-Pays de la Loire, Université Gustave Eiffel, Nantes Université – France

[2]Laboratoire de Planétologie et Géosciences [UMR$_C$6112] –

$-Universitéd'Angers, InstitutNationaldesSciencesdel'Univers, CentreNationaldelaRechercheScientifique, Nantesu$

$UFRdesSciencesetdesTechniques, Universitéd'Angers$:

$UMR6112, InstitutNationaldesSciencesdel'Univers$:

$UMR6112, CentreNationaldelaRechercheScientifique : UMR6112 - -France$

Résumé

On June 16th, 2023 at 18h38 (CEST), a Mw4.9 earthquake occurred between Niort and La Rochelle, France. The earthquake has been felt at great distances, with large intensities, up to VII, felt in the epicentral area, leading to major damages in the small cities of La Laigne and Cram-Chaban, in Charente-Maritime. The main shock is located at 3-5 km depth, with a dextral E-W or N-S sinistral slip motion. No surface rupture has been observed. It was followed by a Mw4.0 aftershock (June 17th, 2023 at 04h27 CEST). In the days after, the national seismological community, trough the research infrastructure Résif/Epos-France, deployed a dense network of 35 temporary seismic stations (velocimeters and accelerometers) within a 10 km radius around the epicenter. The network is composed of 13 three-component MEMS accelerometers, 1 vertical geophone, 16 Fairfield 3-component nodes and 5 broadband (CMG-40T, Titan) seismometers.. Preliminary aftershock locations from this post-seismic network suggest that a vertical E-W fault plane broke during the main shock. The geometry of the fault plane thus has similar characteristics as the last moderate size Mw3.9 Layon earthquake that occurred in 2019 in western France. Despite the fact that their slip motion is in agreement with the NNW-SSE compressional regional stress field, both events are located far from major faults referenced in national databases (BRGM and BFDA), on faults not known at the surface. This suggests that small secondary active faults, possibly associated with the main faults in western France, might be hidden and host the main strains. A better characterization of such structures is needed to better understand the hazard assessment in a stable continental region such as the hexagonal France.

Mots-Clés: earthquake, fault, seismology, tectonic, stable continental region

*Intervenant