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New evidences for offshore recent tectonic activity near Algiers: the Khayr-Al-Din bank, Algeria

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The Algiers region, Algeria, has suffered over the last centuries from seismic activity, with recurrent large (M>6) earthquakes, possibly originated offshore, as in 1365 or 1891. Because of the lack of high-resolution bathymetry, the offshore structures were previously unknown. Thanks to new offshore data (MARADJA 2003 cruise), the NW offshore part of the margin off Algiers has been accurately mapped. These data (swath, backscattering, chirp, seismic) have allowed to identify several active folds and faults, from the coastline, just off the Sahel Anticline, up to the foot of the margin, where a >80-km long thrust, the largest fault of the area, is recognized along the northern flank of the Khayr-Al-Din bank, which probably corresponds to an inherited tilted block. The calculated long-term shortening rate on the latter structure is estimated at 0.4 +/- 0.1 mm/yr from the Quaternary sedimentary pattern, and the maximal magnitude at about 7, which makes this thrust one of the most important seismogenic structures in the area. It contributes to a significant uplift of the margin, and creates a perched basin, as found off Boumerdès. Most of these active blind faults and folds appear to be Quaternary in age and probably reflect a new step in the accommodation pattern of the convergence between the African and European plates. They represent a threat for the Algiers region in terms of seismic hazard but also of geological hazard, such as tsunamis. From this data set and previous studies, a new tectonic framework for the Algiers region is presented, in which the south-dipping offshore structures, depicting therefore an opposite vergence to the main thrusts on land, are the main faults.