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# Fault kinematics and strain distribution within a diffuse plate boundary, geomorphic evidence from the Rif and Moroccan Atlas System

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## Résumé

African-Eurasian plate convergence in the Western Mediterranean absorbs an oblique  $\sim 5$  mm/yr geodesic strain rate, distributed within a 700 km-wide diffuse plate boundary with a complex deformation pattern. Various geodynamic processes are involved, such as subduction roll back, lithosphere delamination, thrust sheet, microplate rotation, back arc transpressive deformations and intracontinental reactivations, that are still in debate and draw significant attention from the neotectonics community.

In this context, Morocco underwent significant historical and instrumental seismicity, along with an important development of urbanized area and large infrastructures. Therefore, it is essential to consider and evaluate seismic fault activity, especially in the establishment of local seismic zoning assessment. How does the tectonic deformation distribute between the structural blocks? What are the prevailing kinematics of active deformation along the main faults and what are the associated structural patterns and slip rates ?

To address the identification and characterization of the main capable seismic faults, we combine remote sensing survey and field morphotectonical prospections to map the fault traces and investigate Plio-quadernary deformations. Building on existing geological maps and structural data from literature, we conducted a detailed geomorphic survey based on open-access satellite DEM and images. We then carried field prospecting along identified fault traces and geomorphic markers to check for surface rupturing evidence, evaluate the faults kinematics from shearing criteria, and assess the coseismic nature of the offset quaternary landforms.

In order to contribute to the updating of the seismotectonic map of Morocco, this study provides some evidence of Plio-quadernary surface deformations along main tectonic structures within the High Atlas, Middle Atlas and Eastern Rif. The identified neotectonic movements indicate oblique deformation in the High and Middle Atlas, along with slip partitioning and slip distribution with compressive motion along fault propagation folds and strike-slip motion along transfer faults. We propose a revised tectonic framework for the junction between the Rif and the Middle Atlas, and show that in the Eastern Rif, while most deformation propagate in the Alboran domain through the Nekor Graben (Al Hoceima), part of the deformation remains inland, within the Atlas domain.

**Mots-Clés:** Morphotectonics, active faults, deformation, slip distribution, Morocco

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