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Seismotectonics, earthquake faulting and kinematic models of active deformation along the plate boundary in North Africa

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We study the distribution of active deformation along the Moroccan and Algerian Rif-Atlas Mountains using Quaternary faults and characteristics of tectonic domains coupled with seismic moment release. Several earthquakes struck North Africa in the last decade showing the predominance of thrust faulting earthquakes with evidence of transpressive deformation. The two most recent M 6.8 Zemmouri earthquake and M 6.4 Al Hoceima earthquake illustrate the complex active fault system that characterize the plate boundary. Seismic moment tensors and related rate of seismicity release and geodetic rate are correlated with the slip rate associated with north-south to NNW-SSE shortening movement along faults. The modelling of active faulting is implemented using the El Asnam type thrust-and-fold structures and provide the spatial coverage along the boundary. Other areas with predominant distributed tectonics and strike-slip motion is understood in terms of a combination of simple/pure shear deformation. The continental strain distribution documents the physical properties of the active deformation along this complex plate boundary.