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The transpressive tectonics and large earthquake distribution along the plate boundary in North Africa

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The Tell Atlas and Rif Mountains of northern Africa have been the site of several large and moderate seismic events in the last decades. However, the thrust and fold system of NW Algeria experienced the largest earthquakes in the last centuries along the Africa-Eurasia plate boundary. This shallow seismic activity was very often associated with surface faulting and deformation as for the Mw 7.3 El Asnam (10/10/1980) and the Mw 6.8 Zemmouri-Boumerdes (21/05/2003) earthquakes. We study the active tectonics along the plate boundary in North Africa from the seismicity database, individual large and moderate earthquakes, the seismic moment tensor summation, the geodetic measurements (GPS and InSAR) and the structural and kinematic of active faults. Neotectonic structures and significant seismicity (Mw>5) indicate that coeval east-west trending right-lateral faulting and NE-SW thrust-related folding result from the oblique convergence at the plate boundary. A simple modeling of block tectonics suggests that transpression and block rotation govern the mechanics of the Africa - Eurasia plate boundary in the Tell Atlas and Rif Mountains. The tectonic restraining bend of NW Algeria combined with the $\sim$ 5 mm/yr convergence between Africa and Eurasia justify the large seismic activity on the thrust and fold system of the Tell Atlas and the relatively passive active deformation along the adjacent sections of the plate boundary.