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Stress change and fault interaction from a two century-long earthquake sequence in the central Tell Atlas (Algeria)

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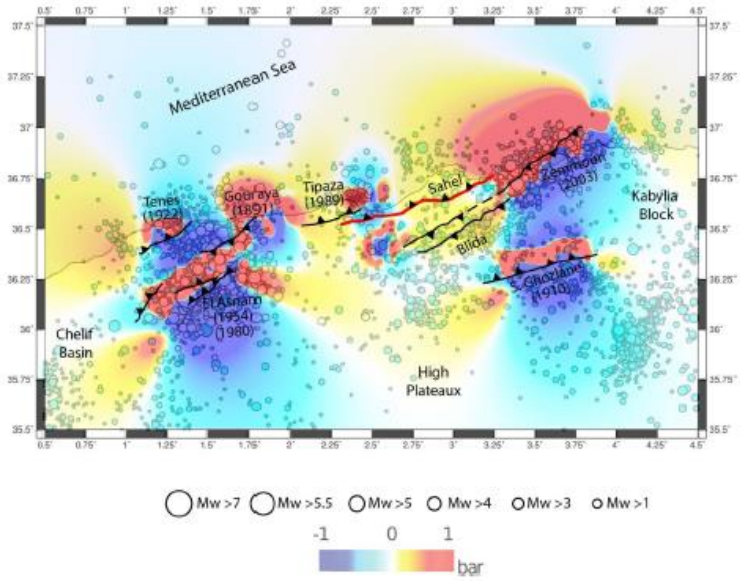
We study the role and distribution of stress transfer that may trigger destructive earthquakes in the Central Tell Atlas (Algeria). A sequence of historical events reaching Ms 7.3 and related stress tensor with thrust faulting mechanism illustrates the Coulomb Failure Function (CFF) modelling [1]. We explore here the physical pattern for a stress transfer along the Tell thrust-and-fold belt taking into account an eastward trending earthquake migration from 1891 to 2003. The Computation integrated the seismicity rate in the CFF computation, which is in good agreement with the migration seismicity. The stress transfer progression and increase of 0.1 to 0.8 bar are obtained on fault planes at 7-km-depth with a friction coefficient μ' 0.4 showing stress loading lobes on targeted coseismic fault zone and location of stress shadow across other thrust-and-fold regions.



The Coulomb modelling suggest a distinction in earthquake triggering between zones with moderate-sized and large earthquake ruptures. Recent geodetic (InSAR and levelling) studies [2] [3] and aftershocks that document postseismic deformation of major earthquakes are integrated into the static stress change calculations. The presence of fluid and related poroelastic deformation can be considered as open questions on the occurrence of major earthquakes in the north-central Algeria.

Figure 1: ΔCFF calculated on fixed fault planes related to the seismic sequence from 1891 to 2003; the Coulomb stress transfer illustrates the fault interactions in the central Tell Atlas of Algeria [1].

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