Supplementary material

An integrated geodynamic analysis of seismic sources in the Eastern Rif: Insights from geological, seismological, gravimetric, and aeromagnetic data

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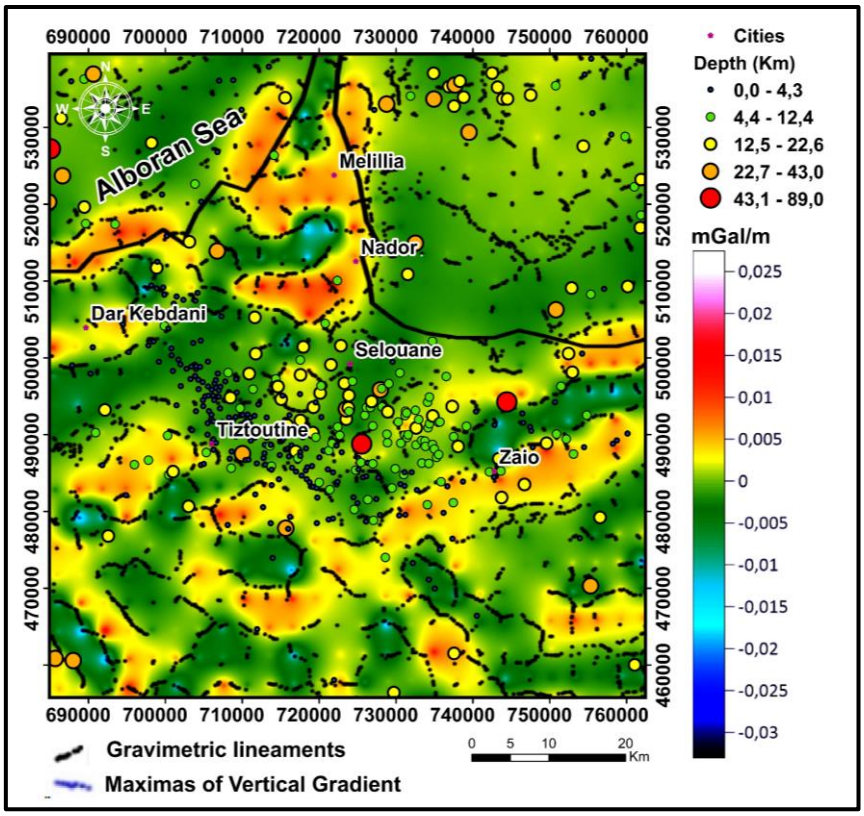


Figure 1. Earthquake distribution over the map of the vertical gradient of gravimetric anomalies (Interval = 0.005 mGal/m).

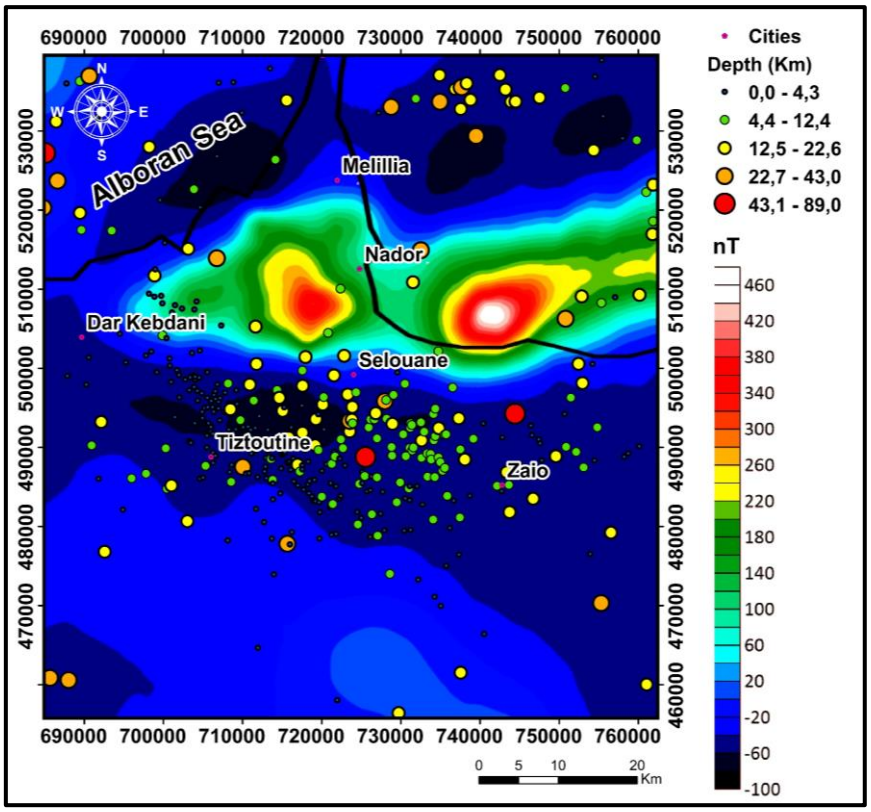


Figure 2. Earthquake distribution over the pole-reduced magnetic anomaly map (RTP) (Interval = 40 nT).

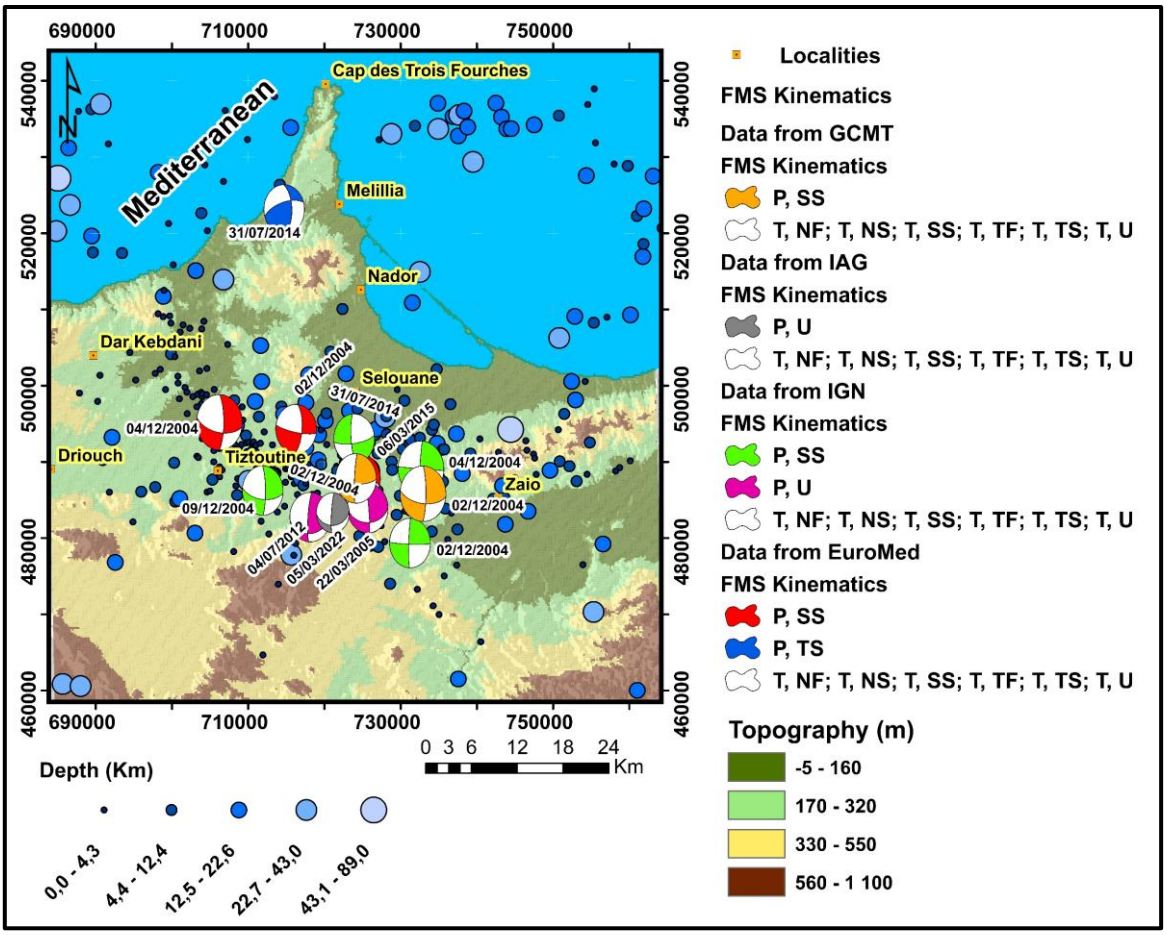


Figure 3. Compilation of focal mechanisms available on the website of the National Geographic Institute (IGN)—Seismic Moment Tensor (RCMT) (1); European-Mediterranean Regional CentroidMoment Tensors (2); Andalusian Institute of Geophysics (IAG) (3); Global Centroid Moment Tensor Catalog (CMT) (4). Seismic data for the period 1960–2025 are from the catalog of the Scientific Institute of Rabat. FMS: Focal mechanism solutions.

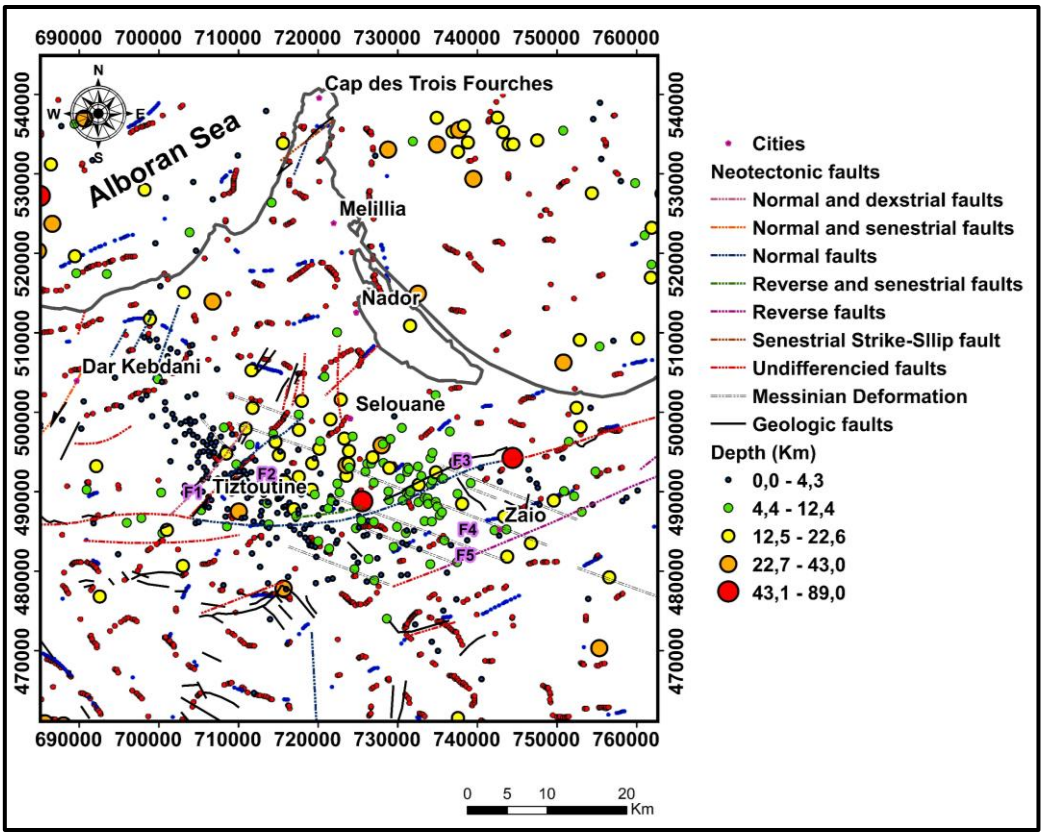
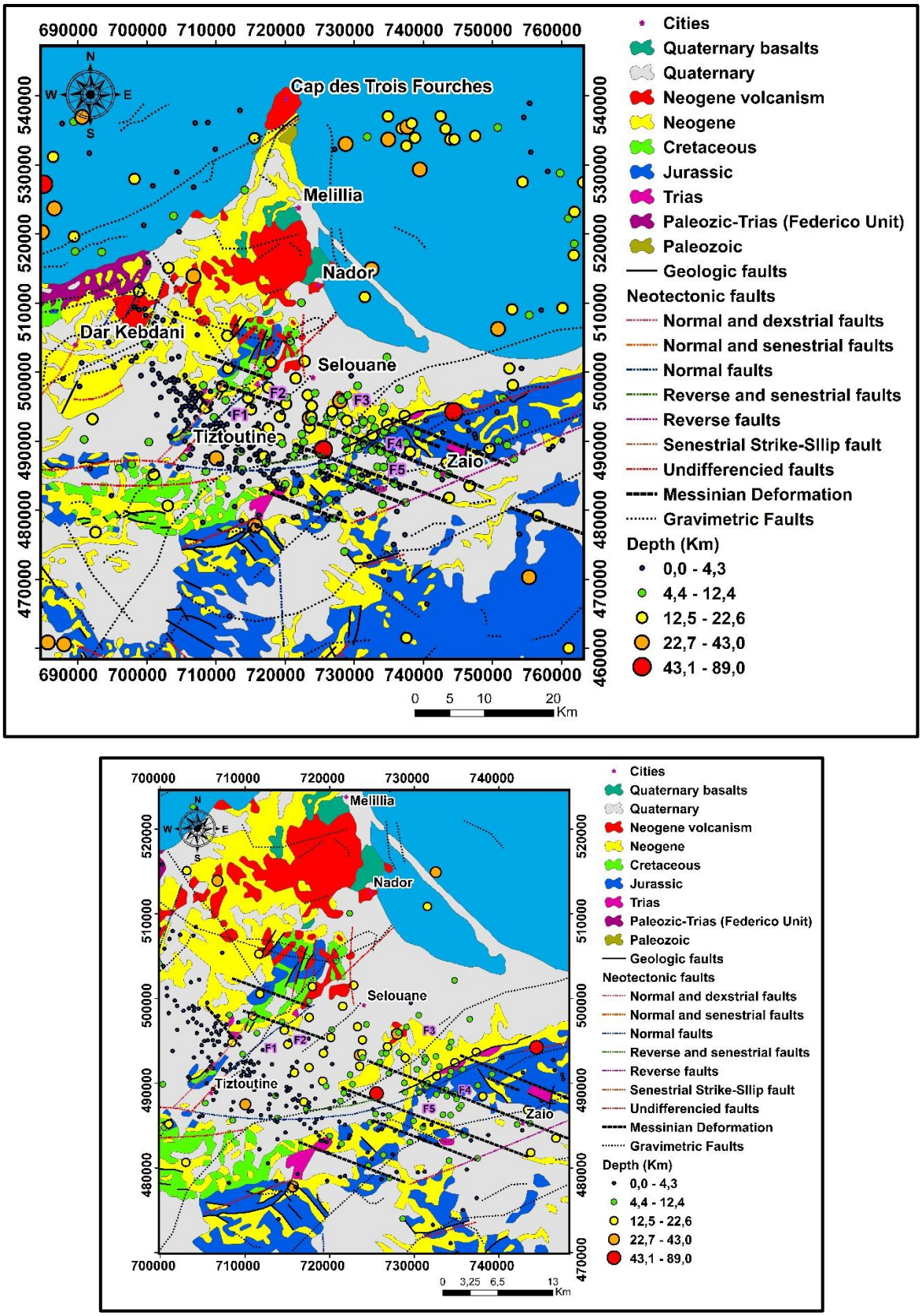


Figure 4. Structural model showing earthquake superimposition on a map of the maxima of the vertical gradient of gravimetric anomalies, as well as the geological and neotectonic faults of the Rif.



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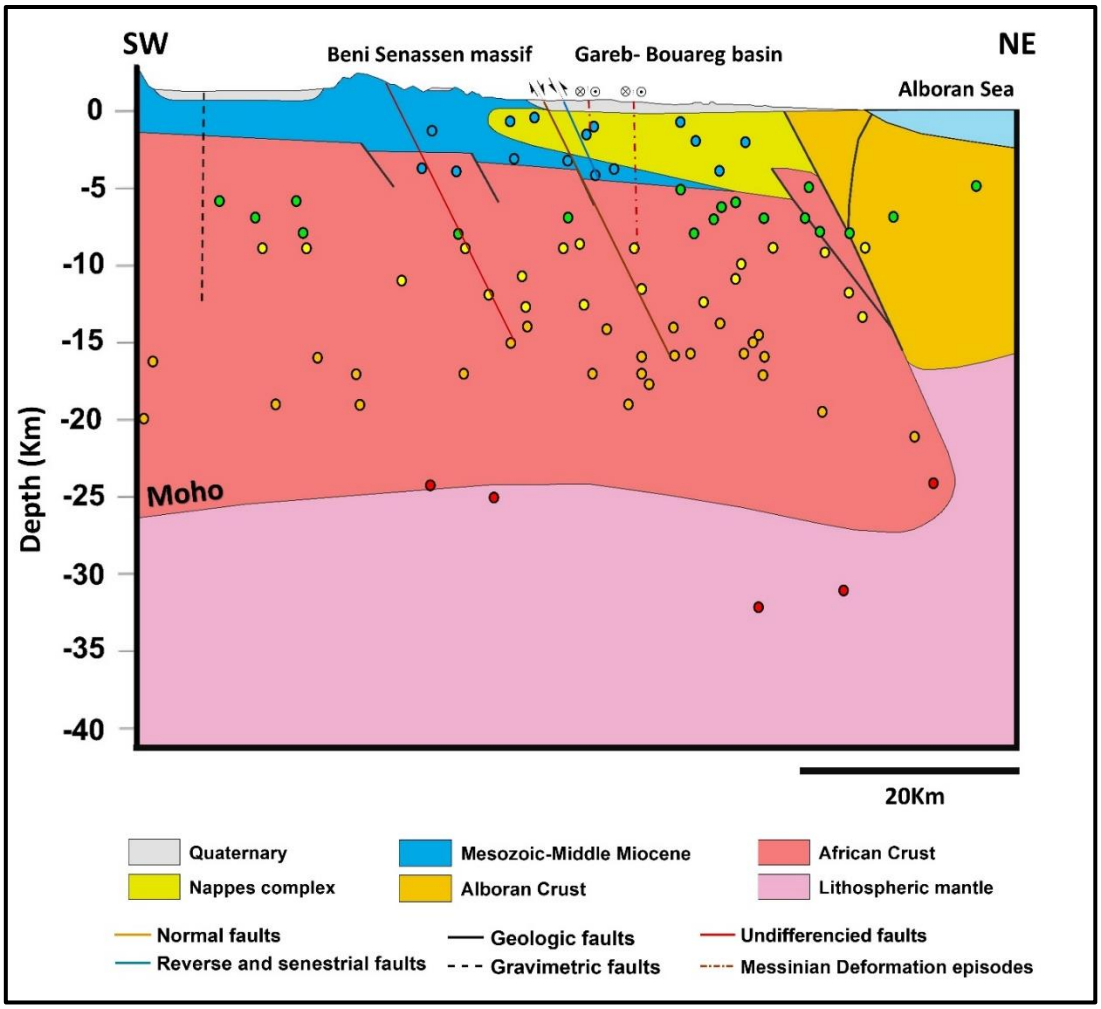

Figure 4. The geodynamic model based on Yahyaoui et al. (1997) illustrates the structural complexity and geodynamic processes beneath the Eastern Rif (Section A-A') to explain the local seismotectonics following the observed seismic crisis. Geological data from the 1:50 000 scale geological maps of Morocco and the 1:50 000 scale neotectonic map of the Rif are used to create the interpreted geological cross-section. It depicts the major faults as well as the arrangement of geological formations.

Database websites:

(1) **Catalogue de l'Institut Géographique National:** https://www.ign.es/web/ign/portal/sis-catalogo-terremotos

(2) **European-Mediterranean Regional Centroid- Moment Tensors Catalog (RCMT)** https://rcmt2.bo.ingv.it/

(3) **Institut Andalous de Géophysique (IAG) :**

https://iagpds.ugr.es/investigacion/proyectos/moment-tensor-catalogue

(4) **Global Centroid Moment Tensor Catalog (GCMT) :**

https://www.globalcmt.org/CMTsearch.html