Kinematic analysis of secondary faults within a distributed shear-zone reveals fault linkages and increased potential seismic hazard

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Contents of the supplementary material

Captions for figures S1, S2, and S3 and for table S1

Figures S1, S2 and S3

Tables S1
Figure and table captions

**Figure S1.** (a) Slope-enhanced shade relief map of the central part of the Alboran Sea without interpretation (white zones correspond to flat areas and dark grey to black to steep areas). Black dashed line rectangles localize figures b to f. (b to f) Detailed slope-enhanced shaded relief maps without interpretation. Isobaths every 100 m. The interpreted version of this figure corresponds to Figure 3 in the manuscript.

**Figure S2.** HR-MCS seismic profiles EVD-125 (a) and EVD-123 (b) without interpretation. AB: Averroes Basin. Vertical exaggeration (V:H) x5. Profiles are located in Fig. 2 of the original manuscript. The interpreted version of this figure corresponds to Figure 5 in the manuscript.

**Figure S3.** (a, b, c) Sections (vertical exaggeration x20) of the sub-bottom parametric profile without interpretation simultaneously acquired with the HR-MCS profile IM-23. (d) HR-MCS seismic profile IM-23 without interpretation. AB: Averroes Basin. Vertical exaggeration (V:H) x5. Profile IM-23 is located in Fig. 2 on the original manuscript. The interpreted version of this figure corresponds to Figure 6 in the manuscript.

**Table S1.** Calculation of the maximum magnitude earthquake for the Averroes Fault (AF) and North Averroes Faults (NAFs) using different empirical relationships.
Table S1. Calculation of the maximum magnitude earthquake for the Averroes Fault (AF) and North Averroes Faults (NAFs) using different empirical relationships.

<table>
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<td>AF</td>
<td>46.6</td>
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<td>699</td>
<td>Mw=5.56+0.87logL</td>
<td>Mw=logA +(3.98±0.03)</td>
<td>Mw=4.18+(2/3)logW+(4/3)log L</td>
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<td>Mw=3.98+1.02logRA</td>
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<td>NAF2</td>
<td>36.5</td>
<td>15</td>
<td>547.5</td>
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<tr>
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<td>3324</td>
<td>7.6</td>
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<td>Mag. out of range (8.1)</td>
<td>7.8</td>
<td>7.6</td>
</tr>
</tbody>
</table>

Area out of range (M 6.9-7.9).


**References:**


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**Notes:**

a. \( L \): surface rupture length in km. Rang Mw 5.9-7.9. \( L \geq 15 \) km. **Application:** All regions for the relevant slip types but acknowledging that the regression dataset will be dominated by plate boundary earthquakes. The author indicates the relationship is most relevant to strike-slip sources.

b. \( A \): area in km\(^2\). Rang Mw 5-8. \( A \leq 537 \) km\(^2\). **Application:** Major plate boundary strike-slip faults with high slip rates. Not suitable for use on faults with slip rates less than ~1 mm/yr.

c. \( W \): width in km; \( L \): subsurface rupture length in km. Rang Mw 5.6-7.8. **Application:** The authors recommend that the regression should be used for strike-slip–to-convergent-dip-slip faults, not for major plate boundary faults. Performs well for strike-slip to oblique-slip faults other than the primary plate boundary faults (e.g., Alpine fault, San Andreas fault) and for strike-slip to oblique-slip faults in low seismicity regions, that is, larger magnitudes for given fault rupture lengths.

d. \( SRL \): surface rupture length in km. Rang Mw 5.6-8.1. SRL from 1.3 to 432 km. **Application:** Relationship for strike-slip sources.

e. \( RA \): rupture area in km\(^2\). Rang Mw 4.8-7.9. RA from 3 to 5184 km\(^2\). **Application:** Relationship for strike-slip sources.