



Searching for Active Faults in the Western Eurasia–Nubia plate boundary

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The repeated occurrence of large magnitude earthquakes in southwest Iberia in historical and instrumental times suggests the presence of active faults in the region. However, the region undergoes slow deformation, which results in low rates of seismic activity, and the location, dimension and geometry of active structures remains unsettled.

We recently developed a new algorithm for earthquake location in 3D complex media with laterally varying interface depths, which allowed us to relocate 2363 events that occurred from 2007 to 2013. The method takes as inputs P- and S-wave catalog arrival times obtained from the Portuguese Meteorological Institute (IPMA, Instituto Português do Mar e da Atmosfera), for a study area defined by $8.5^{\circ}\text{W} < \text{lon} < 5^{\circ}\text{W}$ and $36^{\circ} < \text{lat} < 37.5^{\circ}$.

After relocation, we obtain a lineation of events in the Guadalquivir bank region, in the northern Gulf of Cadiz. The lineation defines a low-angle northward-dipping plane rooted at the base of the crust, which could indicate the presence of a major fault. We provide seismological evidence for the existence of this seemingly active structure based on earthquake relocations, focal mechanisms and waveform similarity between neighboring events.