

The Gulf of Cádiz: thrusting or strike-slip motion?

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Abstract

In the Gulf of Cádiz (SW Iberian Peninsula) the boundary between Eurasia and Nubia plates corresponds to a narrow band well defined by the seismicity, where large earthquakes ($M > 7.0$) may be associated to N-S to NNW-SSE horizontal compression due to the convergence between the two plates. Most of these earthquakes are at shallow depth (less than 40 km), with some foci at intermediate-depth, showing E-W distribution and limited by a narrow band less than 20 km wide that broadens as we move to the Strait of Gibraltar. In this area the lithospheric material is relatively rigid and the stresses are released by larger earthquakes. General tectonic models proposed for the Azores-Tunisia plate boundary explain fairly well the nature of its seismicity and tectonic motions; however, details of some of its aspects are still poorly understood and controversial. Zittelini et al. (2009) has recently proposed for the Gulf of Cádiz, transcurrent-transpressional motion along a long strike slip fault based on multichannel seismic reflection surveys. However, this contradicts the compressional motion and reverse faulting of large 1755 Lisbon earthquake ($\sim M_w 9$), which generate a large tsunami and the recent moderate ($M_w > 6.0$) in 1964, 2007 and 2009 and large ($M_w = 8.0$) in 1969 earthquakes occurred in the region. These earthquakes show thrusting motion along E-W faults with the southern block going under, corresponding to horizontal NW-SE compression, and they can be related directly to the plate convergence between Nubia and Iberia.

References

Zittelini et al., 2009. The quest for the Africa–Eurasia plate boundary west of the Strait of Gibraltar. *Earth and Planetary Science Letters* 280 (2009) 13–50.