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Interactive comment on “The 11 May 2011 earthquake at Lorca (SE Spain) viewed in a structural-tectonic context” by R. L. M. Vissers and B. M. L. Meijninger

Anonymous Referee #1

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This short note describes the remarkable consistency between geological data and the 2011 Lorca focal mechanism, both indicating oblique reverse motion with very similar orientation. The convergence from these different data is in fact nice, and suggests that the earthquake very likely occurred on the Alhama de Murcia fault (which is otherwise not entirely clear, because for the small rupture area of a M 5 event we might as well attribute it to a –known or unknown- secondary fault within the location error ellipsoid).

However, I don't agree with the authors' idea to relate tectonics in the strike-slip corridor directly to African relative NW motion. In short: The authors infer N-S shortening for the Lorca earthquake and the Alhama de Murcia fault, not NW-SE shortening, so this

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appears contradictory. For N-S shortening (consistent with many other P-axes and Sigma1 estimates in the area), just put in the fault plane geometry to see the kinematics we get: strike-slip e.g. on the Palomares fault, oblique reverse on the Alhama de Murcia (at least in this sector). This result is far less surprising than suggested, and more consistent with the well-documented overall left-lateral motion in the strike-slip corridor (striking perpendicular to African relative motion) than with African relative motion itself. By the way, GPS measurements indicate WNW present-day relative motion of Africa rather than NW.

From the seismological point of view, the analysis is exclusively based on routine near-real time estimates by various agencies. It's not fully transparent how these solutions are validated and the preferred moment tensor estimate is chosen. It is not clear beforehand that global CMT is good for such a small and very shallow earthquake. The SLU solution is not shown, and the INGV or GFZ solutions at EMSC not even mentioned (the three are similar. . .). So it seems that the solution is rather chosen for its consistency, which is in my opinion justified in this case, but the authors should say so, and not only show a biased preselection of source estimates in the figure.

Finally, I'm certainly not aware of all previous structural geology studies, but I think the authors missed at least one relevant reference that discussed the oblique reverse kinematics of the Alhama de Murcia fault before: Martinez-Diaz (2002), Tectonophysics 356, 291-305

I think this is a readable and interesting short note, but these three points should probably be addressed.

Interactive comment on Solid Earth Discuss., 3, 527, 2011.

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