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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

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This note discusses the degree of consistency between kinematic indicators on the Lorca fault (SE Spain) and the focal mechanism of the 2011 Lorca earthquake. Bearing in mind the uncertainties in locating the earthquake, it seems likely that it occurred on this fault, which is well exposed near the town of Lorca. The general sense of slip can be inferred from the way in which the primary fault gouge foliation is offset by secondary Riedel shears, and in this respect it unequivocally shows a left-lateral strike-slip component. In fact, I have never seen a fault rock exposure with a better developed set of P foliation and Riedel shear features. It is also clear, from the fact that

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the basement rocks of the Sierra de las Estancias are uplifted relative to the Neogene basin fill lying to the southeast that there is also an apparent reverse dip-slip component of total movement. As the paper points out, the first motion data from the earthquake are also consistent with a left-lateral-reverse sense of slip. Making this point worthwhile and is the main purpose of the paper.

I was a bit surprized by the presentation of the data in Fig.2a, which presumably comes from the the fault gouge zone exposure at the rambla by the Lorca brickworks. In our 1986 paper (Rutter et al 1986, PAgeophysics), we inferred a left-lateral, nearly strike-slip movement vector from the intersections between individual P foliation measurements and immediately associated Riedel shears (R1)in the fault gouge at this locality. In Fig.1a here, although individual P and R1 orientations are shown, there are few of them and their paired intersections are not shown, so the only slip line orientations shown are from slickenlines on Y-shears. I thought more could have been done with the data from this locality, and that the data shown does not constrain the reverse component particularly well. The data from thrust-oriented faults in Fig. 1b makes a better case for the undoubted reverse-slip component. I suspect the showing of P and T axes on these figures without any uncertainty estimates gives an air of precision that may not be warranted. P and T relative 'global' principal displacement axes (not 'stress' axes, of course) have to be inferred subject to a raft of assumptions that are not mentioned here, especially the assumption that there is not other geometric constraint on the movement direction. It may be more meaningful to say that the local principal incremental displacement axes merely lie soemewhere within their repective quadrants. Further, using exposed fault gouge kinematics involves making use of historic features developed sometime in the past when the fault rock was at depth, and therefore may not relate directly to the line of present day movements inferred from earthquakes.

The authors may like to take into account the above comments when finalizing their article.

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