

Interactive comment on “DInSAR coseismic deformation of the May 2011 M_w 5.1 Lorca earthquake, (Southern Spain)” by T. Frontera et al.

Anonymous Referee #2

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T. Frontera and coauthors show that the 2011 Lorca earthquake left a clear signature in DInSAR data, however their analysis and discussion could be improved. Two points that should be addressed before acceptance of the manuscript are:

(1) From vertical displacement modelling (fig. 2), you obtain only a rough qualitative match to DInSAR data. You predict uplift in the hangingwall, but this uplift is too localized and displaced towards SE. I'd conclude that the source parameters you choose are not appropriate and recommend testing other values. In particular, assuming a moment centroid slightly deeper and more to the NW might be promising in order to match better the position and extend of the area that shows uplift in DInSAR. Don't worry about possible discrepancies between geodetic and seismic scalar moments, those are not uncommon. Finally, in modelling coseismic displacement, it's very useful

C598

to show values along a profile perpendicular to the strike to evaluate the fit.

(2) Discussion of the GPS data leaves many open questions. Fig. 1 shows the different motion at stations PURI and GANU compared to TERC and MELL. Projected onto the strike of the Alhama de Murcia fault, this indicates oblique compression with a left-lateral component, ok, but could you be more quantitative? Could you compute strain crosses (e.g. between TERC, MELL, PURI) and compare to the focal mechanism P-axis, to confirm that there is consistency? Instead of the direction, you mention the amount of compression (1.9 mm/year), which shows that relevant strain is localized here, however, to make this point you should compare to regional GPS data or Nubia-Eurasia convergence (~ 5 mm/year). You mention the horizontal components of the coseismic jump at station LORC, what about the vertical component? Is the vertical coseismic displacement consistent with the modelling in Fig. 2? Is the DInSAR long-term motion due to subsidence in the southern block really comparable to the GPS long-term motion? For your comparison, you choose 18 cm DInSAR subsidence, but this is the maximum subsidence, while from Fig. 2 it seems that subsidence at the site of the Lorca GPS is far less, so the local rates of subsidence from DInSAR and GPS are actually quite different.

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C599