

Comments to the manuscript:

“DInSAR coseismic deformation of the May 2011 Mw 5.1 Lorca earthquake (Southern Spain)” by Frontera et al.

The paper presents the study of the coseismic deformation occurred at the Lorca region as consequence of the May 2011 earthquake. The study of processes related to tectonics in a complex region as the SE of Iberia is always welcome, however the manuscript has important deficiencies and it is necessary to improve the manuscript before to be accepted. Main comments are:

1. It is true that the Lorca 2011 earthquakes produced important human and economic damages at the region, but previously other recent earthquakes produced severe damage in this region, however in the manuscript there is a total lack of information about these earthquakes. Authors must give information about this previous seismicity for the instrumental period (1977 Lorca, 1999 Mula and the 2005 Bullas earthquakes) but also for the historical seismicity, in this region has occurred the large 1829 earthquake. The aftershock location (figure 1) has been estimated by authors? If it has been estimated by other author or agency, they must include this reference in the paper. The FAM is described as “oblique slip fault”, however on most of the papers is described as “strike-slip reverse fault”. Authors must explain why they consider the FAM as “oblique slip fault”.
2. The authors must explain with more detail the CuaTeNeo network. Is it a permanent or temporary network? What is the observation period? For this region exists results from GPS observation from other authors such as Serpelloni et al (2007), Stich et al (2006), Perez-Peña et al (2010). Authors must include these results on the discussion.
3. May be the CuaTeNeo network not detect coseismic deformation due to the Lorca 2011 shock, however the GPS LORC station has recorded an important co-seismic jump (5 mm). These data are public and available, the authors may carry out a comparison between this observation and the numerical coseismic deformation obtained in the manuscript. Are both of the same order? The authors has used a 4kmx 2 km fault and 15 cm of slip on the numerical modeling, however we can obtain the same scalar seismic moment (4.9×10^{23} dyn cm) using other dimensions and slip, why are they choose this values? Other geometries have been tested?
4. Finally, the intensive groundwater extraction cannot explain the jump observed at the LORC GPS station. If the groundwater extraction would be the origin, it would be a slow deformation, but the jump observed at the GPS LORC station is instantaneous and at same time that occur the shock. In addition the great damage observed at the Lorca city must be related to the ground motion at the epicentral region.

References

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- Pérez-Peña, A., Martín-Davila, J., Gárate, J., Berrocoso, M. and Buforn, E. (2010). Velocity field and tectonic strain in Southern Spain and surrounding areas derived from GPS episodic measurements. *Journal of Geodynamics* 49, 232–240