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Title: On the complexity of surface ruptures during normal faulting earthquakes: excerpts from the 6 April 2009, L'Aquila (central Italy) earthquake (MW 6.3)
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The manuscript se-2013-52 of Bonini et al. addresses the issue of surface faulting during the 6 April 2009 earthquake (Mw 6.3) of the Abruzzi – Apennines region of Italy. The authors collect geological, seismologic and geodetic data to analyze the fault geometry at depth (3 to 10 km) and at the sub-surface (0 to 3 km). The authors consider that the 2009 coseismic ruptures and related surface breaks do not represent the earthquake faulting and cannot be considered further in any seismic hazard analysis. In order to support their inferences, they perform analogic modeling with two alternatives using wet clay and dry sand media. From their modeling results, they suggest a nomenclature of 5 possibilities for the surface geometry of normal faulting earthquake taking into account their relationships to the inherited geological structures.
The presented ideas are quite attractive but flaws appear quite often and I did not go along with the data analysis, text wording (too verbose) and field data analysis. The modeling and related inferences are, unfortunately, not always supported by the data. In several part of the article, the presentation of data and interpretations are mixed in order to justify their inferences. In the absence of a thorough analysis of their analogue modeling (the main new contribution for the 2009 Aquila earthquake studies), I cannot for the moment recommend this article for publication and I suggest major revision.

In the abstract, the authors insist on the presumably ambiguous 2009 surface faulting and they straightforwardly declare that they reconstructed the "full" geometry of the seismogenic source.

In page 2 (last paragraph), they state that "The 2009 event is the best documented continental extensional earthquake worldwide …". This statement seems to me excessive since other normal faulting earthquake in the Gulf of Corinth (Greece), Basin and Range (USA) and East African Rift System may challenge their point of view. On the same kind of reasoning, in page 4 (second paragraph) they come back with the "an extraordinarily detailed double difference catalogue of relocated event …" which is another exaggeration in the wording since hypoDD and tomoDD are now used for most earthquake aftershock studies. This style is quite often used throughout the text and affects the clarity of the article.

(page 5) The authors do not seem to understand the complexity of earthquake faulting associated with moderate earthquakes (Mw < 6.5) and the threshold for earthquake ruptures to reach the surface. I really fear that their criticisms concerning the mapping of earthquake faults associated with moderate earthquakes do not appear as a neutral analysis of field data with consideration of the nature of superficial geological units. Similar remarks are addressed to the geodetic studies (InSAR and GPS) concerning their assumption in their modeling of a planar fault geometry reaching the surface and coseimic slip distribution; here again, their statement that the coseismic rupture did not reach the surface in 2009 suffers no alternative for them. In contrast, they provide no alternative modeling with curved fault rupture.

In figure 2a the location of cross sections S1 and S2 (in figure 3) are hardly visible.

In figures 3 a and b, red lines drawn on aftershocks may not necessarily represent the coseismic fault plane and it appears as imposing an interpretation on the fault geometry.

Section 4 (page 6 to 9) dealing with the analogue modeling is the major part of the article and the new contribution in this article with regards with previous publications on the 2009 Aquila earthquake. Although the attempt of reproducing the crustal deformation and faulting within the 10-km-thick crustal structure of the Apennines can be instructive, the modeling experiment itself is weakly tested and consists in a limited number of possibilities that may address the issue of surface normal faulting in a complex geological background. The experiment fixes the velocity of the driving motor to a single value 0.005 mm/sec. The resolution and scaling of the successive modeling steps is poorly described. Not a single diagram of results is presented (e.g., velocity versus fault rupture formation and propagation; dip angle of ruptures versus the timing of rupture propagation, etc.).

In discussion, the constructed models are considered as they are the real and final structural geometry of the coseismic faulting. This is stated in the first line of page 11.
In their conclusion, the five categories of surface normal faulting put forward in page 13 would be quite useful if only supported by more examples and case studies of surface faulting. It is curious that in this section, no comparison is presented with surface faulting of the 1980 Irpinia major seismic event and 1997 Colfiorito earthquake.