

Interactive comment on “Earthquake-induced ground failures in Italy from a reviewed database” by S. Martino et al.

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The paper is a well written description of a catalogue of ground failure effects. I have suggested "minor revisions" but they are at the significant end of what I would consider as minor. Having this database widely available will be valuable but it is presented in a rather uncritical manner. There are significant omissions here – some of which may be fixable depending on the nature of the database. Having worked with some of the historical documentation available – specifically Vivenzio and Sir William Hamilton's work (the latter being strongly derivative of the former) I can sympathise with the challenges.

The major problem I have here is one which the authors have alluded to but not discussed sufficiently. That is the significant error in the data. This is the epicentral error

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and the second is the locational errors associated with the ground failure.

1. The epicentral errors listed in the work by Pospichl (1985) can be substantial. For older events this can be as large as 200km. The authors correctly mention the lack of surface rupture data which means that using this to constrain location is generally impossible. While I recognise that such large errors relate to the pre-1400(ish) events even the Calabrian earthquake sequence errors are of the order of 25-50km and when the authors start talking about modal epicentral distances to landslides of 10-20km (page 2053, line 12) and up to 30 km (p2053, line 19) it means that such errors become substantial for the older events. I recognise that these may relate to younger and more precisely constrained earthquakes but this really needs some discussion.

2. One significant omission is data on the depth of the events in question. Looking at the distribution of seismicity in figure 7 all of the quakes listed are likely to be shallow focus. There has however been large magnitude events in the Tyrrhenian Sea associated with down dip compression of the relict subduction zone. It would be useful to comment on this as some of these have been felt (and I think some shallower ones may have caused damage). It became apparent after the 22nd Feb 2011 Christchurch earthquake that even within "shallow" earthquakes, the detail of the depth is hugely significant.

3. I think the way in which the lithological data has been tied to the landslides is weak. Again I recognise the issues with the imprecision of the map sources and having tried to do this for the 1783 earthquake sequence I recognise the difficulties. I used the rather excellent set of geological maps of Calabria published by La Case per il Mezzogiorno but they were devilishly difficult to get a hold of and their coverage was incomplete. The imprecision of the map data casts significant doubt on the lithological interpretations. The authors are not blind to this, and it is discussed, but it weakens this section somewhat. Equally the precision of the landslide location is difficult – some of the sketches of landslide dammed lakes for the 1783 events helps, but this is a rare luxury when it comes to a list of ground failures. It may be that nothing can be done

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about this but why was such coarse data used? With so many uncertainties I would have thought that this was one thing to try and constrain as tightly as possible.

4. I think surface rupture should be removed from the discussion. Some of this is either unrecorded or prone to misinterpretation, could have been offshore (e.g. slip on the Messina-Commiso fault – excuse me if this is a spelling error but I am not in a position to check this at the moment – causing the 1908 Straits of Messina earthquake) or has patterns of distributed strain which means that slip is partitioned onto multiple faults (e.g. Irpinia, 1980 – only 0.1m was noted at Piano di Pecore).

5. What do the authors mean by “ground changes”? Is this a neotectonic effect or some form of undifferentiated slope movement? This needs to be defined.

6. EMS – I think this should be European not Environmental (page 2045, line 18). I could be wrong about this and I would ask the authors to check this.

7. There are significant problems with trying to correlate Intensity with magnitude (page 2050, lines 9-14) as depth, duration and site conditions are all likely to affect intensity. The authors give ranges for estimated magnitudes based on intensity but I think there needs some supporting citations to support this.

8. Fig 12 needs some further discussion. It has anything of up to 15% likelihood of some form of ground failure at MCS=VI but different ground failure effects are criteria for intensity classifications in addition to building response. Does this not make the discussion rather circular? Have a think about this.

9. Figs 12 and 13 need some discussion about the methodology for the production of these. I suspect that this involves some over-interpretation of the available data but it is difficult for me to judge this without more discussion of this. The X axis scale on Fig 13 should be clearly stated as being logarithmic.

10. I would like to see some error bars on figure 14.

Overall I enjoyed reading this submission and I think there are great data in this cata-

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logue which I would like to have a hard look at. However, I think the authors need to spend a bit more time addressing the precision and accuracy of the data as readers who are not familiar with Italian historical sources, as rich and fascinating as they are to use, may not appreciate some of the errors and uncertainties inherent within the documents.

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