

Interactive comment on “Changes in ground deformation prior to and following a large urban landslide in La Paz, Bolivia revealed by advanced InSAR” by Nicholas J. Roberts et al.

Anonymous Referee #1

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Dear authors,

The presented paper contains very interesting and useful approach and results for landslide movement studies with important implications for the hazard assessment applicable in regions where landslides are major problem. It is very well written and presented and the results are quite interesting for wide audience. But I think that your interpretations are not well supported by the results and available data and that you missed important geomorphological evidences with important implications for the result interpretation. I think that the studied landslide is not suited for investigations of the simple post-failure movement behavior which suggests at least temporal stabiliza-

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tion of the landslide after its major failure. Plus the InSAR results need to be combine with detailed, site specific geomorphological/landslide mapping which was not done (or at least was not presented) and therefore I am convinced that some of the interpretations should be changed/improved. Your statement challenging the post-failure “stabilization” theory are not well documented in the article: You did not defined the “hypothesis” about stabilization after failure - how do you assess the “stability”? I am sure that factor of safety of the main sliding plane calculated after the event would be much higher than before, clearly showing the slope stabilized. Surface movements observed by InSAR technique do not necessarily represent failure plane movements. As far as I know, the post failure “stabilization” has never been the only or major hypothesis about landslide movement. There is very common concept of post-failure adjustment which includes increased activity mainly around the scarp and toe if river is eroding it and locally on sites with steep slopes. Moreover, the landslide you describe represents reactivation of deep and complex landslide and in such cases (regions with long term, complicated landslide history) it has been observed before that reactivation of one part may trigger activity in other areas (domino effect). Whereas I think that the theory of post-failure stabilization has always been limited rather to simple landslide cases (which are not the one you describe). Therefore I disagree with interpretation of your measurements – they very nicely document complex landslide behavior which correct (as far as I can tell from looking at the Earth Google images) explanation would require detailed geomorphological interpretation of the well morphologically defined “paleo landslide” (yellow line on the attached Fig. 1 EarthGoogle image below), which N limit is some 400 from the 2009 landslide well defined by escarpment. It seems that this paleo landslide body is strongly segmented by gullies running to the main river valley as well as significant slope forming toe of the 2009 landslide above the creeping region with “i” on Fig. 7A.

For further comments, please see the attached files. Please, consider the attached figure only as a suggestion.

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Please also note the supplement to this comment:

<https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2018-211/nhess-2018-211-RC1-supplement.zip>

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2018-211>, 2018.

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Fig. 1.

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