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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Pre-, co-, and post-rockslide analysis with ALOS/PALSAR imagery: a case study of the Jiweishan rockslide, China" *by* C. Zhao et al.

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We thank you very much for the careful review comments and constructive suggestions, which make our manuscript greatly improved. We have revised the manuscript in details. The following are the detailed responses and revision according to review comments.

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Reviewer #1:

SUMMARY

The paper describes the application of SAR-based techniques to characterize a large rockslide occurred on June 2009 in the Chongqing Municipality of China. The manuscript is concise and fairy well written and the objectives of the work are clearly stated in the Introduction. Although the authors use conventional SAR techniques and do not provide any new insight on methodological issues, their case history is interesting and demonstrates how powerful these techniques are. The paper, however, needs some strengthening to support the results obtained by the analysis and to highlight the limitation of the methods. Moreover, it could be better arranged and a few sections need clarification.

"Thank you for the positive comments on our manuscript."

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1, Since the paper deals with the application of conventional techniques to a case study, the case study must be carefully described and properly illustrated. My suggestion is to end the Introduction at row 24 of pag.1801, and to add a new section (e.g. Section 2. Case study) that contains and further expands the description of the rockslide now reported in the second part of section 1 (from row 25 pag.1801 to the end).

It's important to provide a map of the landslide showing the main geomorphological features of the phenomenon (main crown, deposition zone.) and its historical activity.

The landslide description should refer to this map since the shaded relief reported Fig.1 is not informative enough.

»"We take the place of Fig. 1 with the Jiweishan geomorphological map, so that much more Jiweishan rockslide background information can be provided."

»"As suggested, we add Section 2. 'Background of the Jiweishan Rockslide' to describe Jiweishan rockslide in more details."

2. Add the landslide boundary in Fig.4 and 5, using different line styles to indicate the different historical/precursory movements (such as those shown in Fig.3), and explain more clearly which slope deformations are captured by the analysis of the pre-rockslide SAR data. For instance, it's not clear (to me) what are the two "driving and resisting blocks" described in section 4.1 page 808.

Please add the two blocks in Fig. 5. This will probably explain why the higher displacement rate was recorded at the toe of landslide rather than on the crown area (a quite unusual behavior for an incipient rockslide).

»"We revised Figs. 4 and 5 by delimitating driving block and resisting key block. Most historical/precursory movements occurred on driving block, so three cracks to the west and south of driving block were prograssively formed (See Fig. 1)."

3. Provide a figure showing the source-scouring-deposition areas detected by the analysis of the Intensity change (Fig. 7) overlapped to the aerial photograph of the rockslide.

A direct visual comparison can be useful to appreciate both the potential and the limitation of this method for the automated mapping of large landslides.

»"We have revised Fig. 7 by adding (4) 'aerial photography after sliding' to visually compare the affected areas inferred by both SAR intensity method and aerial photography method. Accordingly, the reason for their inconsistence is analyzed."

4. I've not understood why the values of DEM change are both negative or positive in Fig. 9 (as expected) and only positive in Fig.8. Please check the consistency between the two figures.

»"The color bar in Fig. 8 shows the DEM change direction, that is, the color sequence yellow-green-blue-red is the increasing direction of DEM change, vice versa. Accordingly, the source area is negative DEM Change, while the deposit area is positive DEM change, which is validated with Fig. 9."

Besides, the revised PDF file with modify mode is attached seperately.

Please also note the supplement to this comment:
http://www.nat-hazards-earth-syst-sci-discuss.net/1/C559/2013/nhessd-1-C559-2013-supplement.pdf

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Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 1, 1799, 2013.

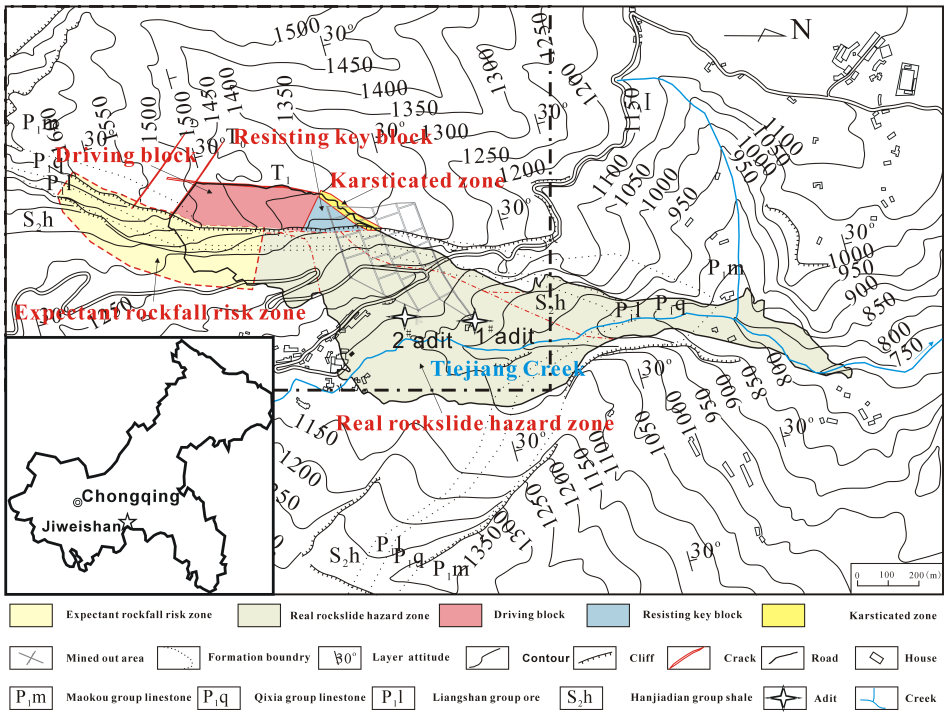

Fig. 1. Geomorphological map of the Jiweishan range, Chongqing Municipality, China.

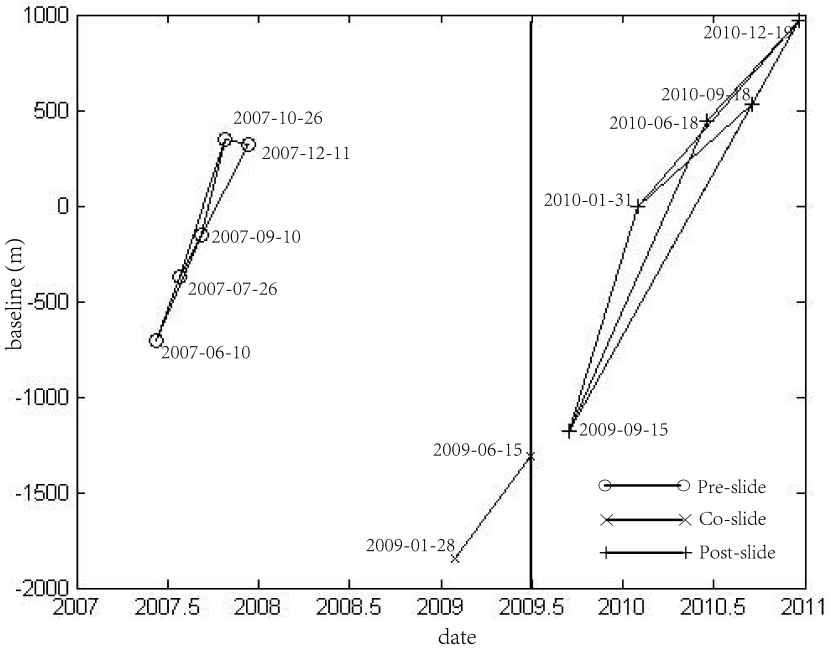

Fig. 2. Schematic figure on SAR combinations of ALOS/PALSAR imagery data for the Jiweishan rockslide analysis, different symbols indicate different SAR combinations.

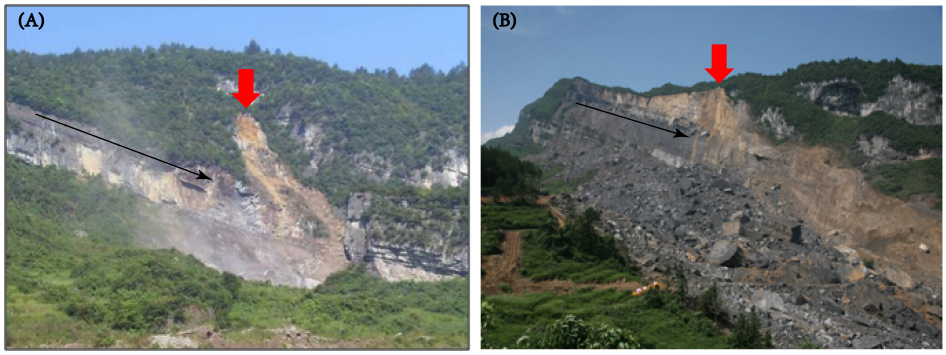

Fig. 3. Two photos over the Jiweishan rockslide, (A) taken 5 hours before sliding and (B) taken after the sliding.

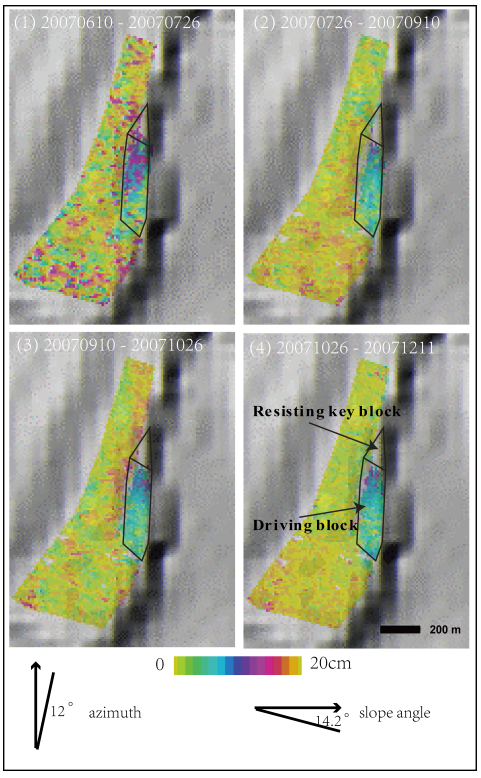

Fig. 4. Deformation maps within 46 days over the Jiweishan region before 5 June 2009 sliding.

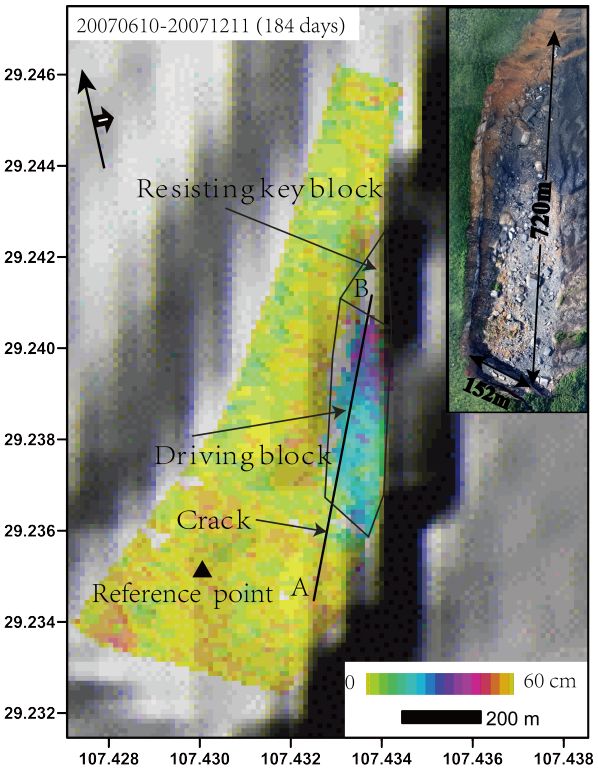

Fig. 5. The cumulative deformation map during 10 June and 11 December 2007 (184 days).

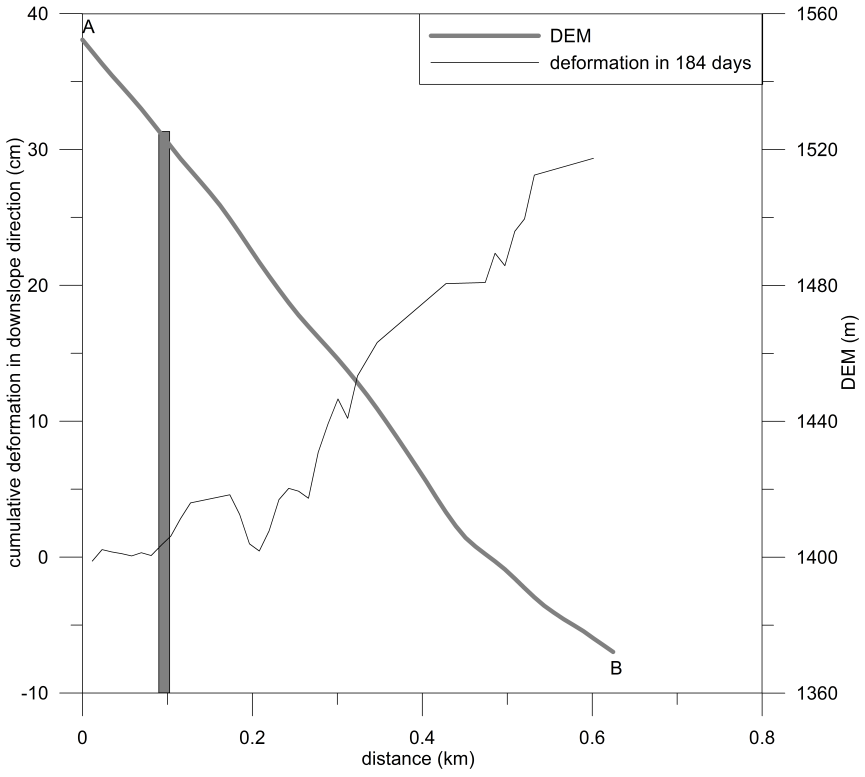

Fig. 6. Cumulative deformation in downslope direction within 184 days and SRTM DEM along profile AB shown in Fig. 5.

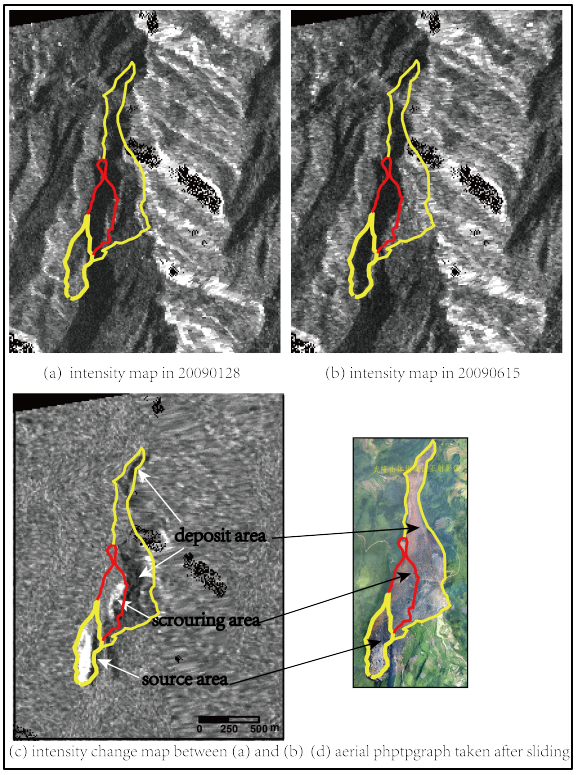

Fig. 7. Two SAR Intensity images acquired on 28 January 2009 (a) and 15 June 2009 (b). (c) Intensity change map between (a) and (b).

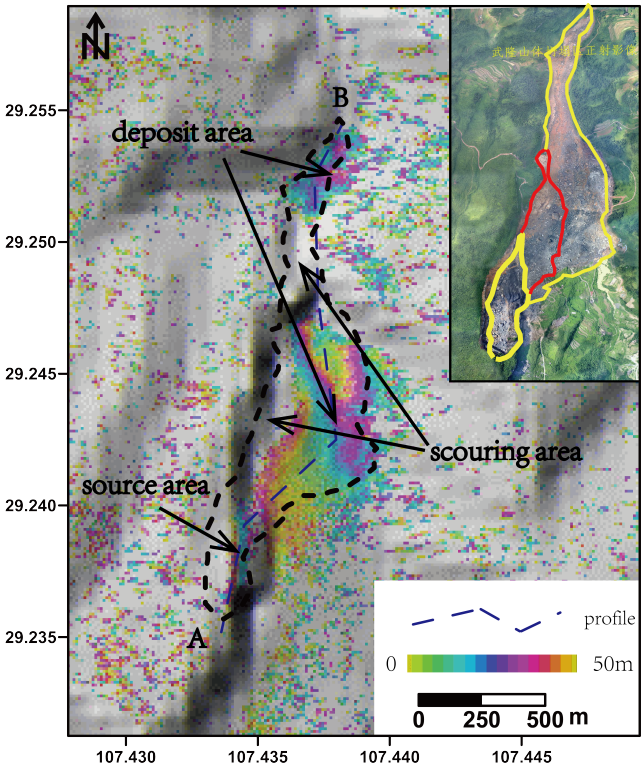

Fig. 8. DEM change map calculated by InSAR stacking method after Jiweishan sliding.

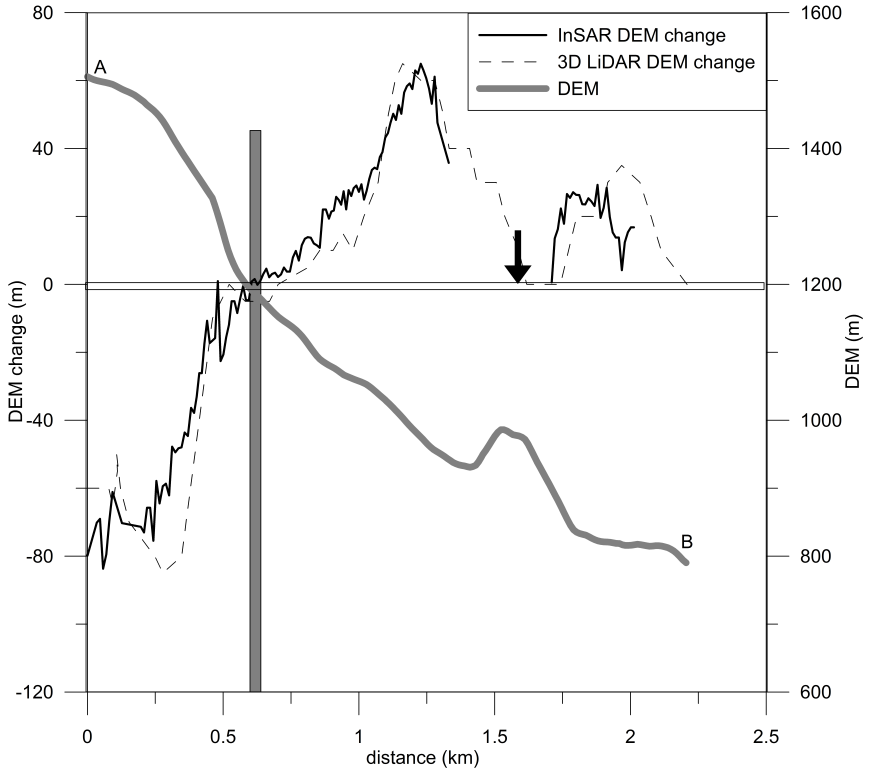

Fig. 9. Cross-section of pre-slide SRTM DEM, DEM change measured by InSAR and 3D LiDAR techniques after Jiweishan sliding along profile AB.