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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Source model of 18 September 2004 Huntoon Valley earthquake estimated from InSAR" *by* W. J. Lee et al.

Anonymous Referee #2

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The manuscript presents the study of an earthquake occurred at Huntoon Valley on 18 September 2004 by using InSAR data acquired from ascending and descending orbits by ENVISAT satellite. The main finding of the manuscript, as stated in the Abstract and in the Conclusions, is that global seismic catalogues can be improved by InSAR-derived deformation fields. The manuscript, however, appears to be a simple application of consolidated InSAR and analytical modelling techniques to a selected case study, implying a poor level of innovation. Indeed, InSAR is used since long time for measuring ground displacement induced by earthquakes; then, no evidence of novel InSAR algorithm/technique has been provided for the proposed analysis. In addition, also the used modelling approaches are well established and largely applied to InSAR data. The only innovative aspect found in the manuscript is a more detailed

characterization of the studied event. Therefore, I do not recommend publishing the manuscript in its present form because significant modification should be performed to highlight and clearly state its innovative contribution. In the following, authors can find some questions and comments that should be addressed in a new version of the manuscript.

InSAR processing left me a bit confused. Indeed, the use of large time span interferograms, particularly on ascending orbits, seems to be unjustified. The risk to include post seismic effects is not negligible and should be properly taken into account during modelling. This also implies the inclusion of many other seismic events that occurred after the 18 September one, as for instance those of around 2008 (as shown in Figure 5), that can influence the retrieved cumulative displacement. In addition, the large temporal baseline (often more than 1000 days) could strongly affect the InSAR coherence. Since no information on the general coherence behaviour of the scene has been provided, it is difficult to evaluate the impact of this aspect on the resulting averaged deformation maps. In general, a more detailed analysis (in terms of perpendicular and temporal baseline) on the full available ENVISAT data set should be presented, aimed at justifying why the authors used only the selected interferograms for producing the displacement maps. For instance, Bell at al. 2008 used a different data pair, even if probably on a different track. The generation of the displacement maps should be also better clarified: what "average" means in this case? Are the authors applying any stacking approaches? I suppose averaging has been conducted on unwrapped interferograms: please clarify. Another aspect that makes me confused is the actual improvement that InSAR could give to the seismic catalogues, either global or local. Indeed, InSAR-derived fault parameters seem quite similar to the local catalogue CISN but also to the global one named as PDE, as reported in Table 1. In addition, authors state that the CMT catalogue parameters are considered as biased, but what about the local NCAeqDD (which presents a Depth value of 3.2 km)? Finally, no mention is given on the limitation of InSAR, as for instance the inability to discriminate different events occurred at very close times.

Minor comments:

Pag. 4291, line2: the expression within brackets depends on the orbit direction. The projection of the same displacement vector along the LOS has different impact on ascending and descending passes. Pag. 4291, lines 5-6: What “r” is? What u_asc, u_dsc are? Pag. 4292, line 14: please use International units Fig. 2: Please indicate millimetres instead of radians. In addition, the indication of “LOS direction” in panel (a) and (b) should be inverted. Table 1: please use correct sign for longitude values. Table 4: please use correct sign for longitude values.

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