Natural Hazards
and Earth System
Sciences

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Discussions

Interactive comment on "Modeling of fast ground subsidence observed in southern Saskatchewan (Canada) during 2008–2011" *by* S. V. Samsonov et al.

Anonymous Referee #2

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GENERAL COMMENTS

The authors of this paper exploit the InSAR technique to study the fast ground subsidence in southern Saskatchewan (Canada). They use two different RADARSAT-2 data sets along both ascending and descending orbit aquired during 2008-2011. They observe two circular regions subsiding very fastly and model the occurred deformation with two different source types. The authors are not sure about the cause of the observed deformation but they discuss the problem in detail and propose a solution that appears quite reasonable. The topic and the used methodology is not new but the work is well defined, the results are presented in a clear and appropriate way and described

with a good scientific language property. I think that is good work and is appropriate for a publication in the NHESS.

SPECIFIC COMMENTS

1. In the abstract you wrote that the smallest residual was achieved in case of sill model using both, ascending and descending data, but it is not true. I agree on the more robustness of the joint inversion models (indeed no outliers were produced) but you obtained the smallest residual in the case of sill sources and ascending orbit data (as shown in table 2).

2. Introduction: I did not well understand when you write that the "typical spatial resolution of InSAR measurements is 1-10 m". The spatial resolution depends on the used data (for example ENVISAT and ERS provide an about 4x20 m spatial resolution) and on the chosen multilook factors. Please could you explain better?

3. Data processing: Did you fixed also a maximum temporal baseline in the interferogram generation?

4. Data processing: Why did you choose these multilook factors? I know that the GAMMA software works well with squared pixels. Maybe it would have been better to use different multilook factors, for example for the MF3F data you could have used 7x5 in order to have a pixel spatial resolution of about 20x20m. I never work with RADARSAT-2 data so I would like to know if there is some reasons to work with no squared pixels.

5. Results: Why do not you use the cumulative displacement as input for the modeling? Could you exploit a single interferogram converted to ground displacement and scaled to annual rates because the trend is quite linear? Please comment on this.

6. In table 1 could you explain the way to estimate the angle alpha?

7. In figure 8 you show two different plots for the simulated deformation rate based on joint inverted best-fitting parameters. I think this is due to different source location in

the case of ascending and descending data. Can you confirm it? please say something about this in the caption. Obviously the same is for figure 9.

8. Is the sill source a good source model to justify a deformation occurred due to mining deposits? Could you add something on this?

TECHNICAL CORRECTIONS

Abstract, line 11: I suggest to write "...April 2010 thanks to particularly..."

Introduction, 5883, line 9: I would write in the following different way: "Subsidence produced by earthquakes, mining collapses and sinkholes generated by karst processes is usually spatially and temporally localized..."

Results, 5890, line 9: "than in the ascending one"

Figure 2: Please add a spatial scale

Figure 4d, 5d, 6d, 7d, 8g, 8h, 9g, 9h: Please add LOS deformation rate on the vertical axis name

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