

Dear Editor Albert Kettner:

Thank you for your comments concerning our manuscript entitled “Simultaneous state-parameter estimation of rainfall-induced landslide displacement using data assimilation” (nhess-2019-24). We have studied the comments carefully and have made correction which we hope meet with approval. All the revisions of the article are marked in red. We should like to express our appreciation to you for suggesting how to improve our paper.

Answers to comments:

1. Throughout the document, make sure that the references are cited properly.
Answers: Thank you for your advice. We have corrected the citations in Page 1 Line 23, 29, 30, 31. Page 2 Line 2, 3, 7, 8, 9, 11, 12, 14, 15, 16, 21, 23, 24, 25. Page 3 Line 11, 16, 23. Page 4 Line 10. Page 6 Line 13, 14. Page 7 Line 15.
2. Page 1, line 13. Do the authors mean “Simultaneous state-parameter estimation” or as indicated in page 1, line “simultaneous states and parameters estimation”?
Answers: We mean “simultaneous states and parameters estimation”. And we have corrected this in Page 1 Line 13 and 14.
3. Page 5, line 9. “Combining the two we can build the landslide and the model parameters.”
Answers: We have corrected this incorrect grammar in Page 5 Line 9 and 10.
4. Page 6, line 11. Remove ‘is’: “...is can be ...”
Answers: We have removed ‘is’ in Page 6, Line 11.
5. Page 6, line 21. ‘of the left bank slope...’. Rephrase this such that it reads ‘ of the northern bank slope...’.
Answers: We have rephrased it into “...northern bank slope...” in Page 6 Line 21.
6. Page 7, line 1. Rephrase so it reads “...can lead to the movement of about 85....”
Answers: We have rephrased it into “...lead to the movement of about...” in Page 7 Line 2.
7. Page 7, line 9. Rephrase so it reads: “Five continuous GPS observation stations have been set up for the Xishan Village landslide for obtaining any deformation observations.”
Answers: We have rephrased it into “Five continuous GPS observation stations have been set up for the Xishan Village landslide for obtaining any deformation observations.” in Page 7 Line 10 and 11.
8. Page 7, line 27. The monitoring GPS sequence contained significant noise or errors. In order to reduce the influence of this, the...
Answers: We have rephrased it into “the monitoring GPS sequence contained significant noise or errors. In order to reduce the influence of this ...” in Page 7 Line 28.
9. Page 7, line 27. Indicate how it was decided to take a 5day time step. Why not 3 days or 7 days? What procedure was used to find the optimum of 5 days?
Answers: After experiment and evaluation among different time steps, five days’ time step gives best correlation with rainfall data. Therefore the time step is set to five days. And we have added this in Page 7 Line 28 and 29 and Page 8 Line 1.
10. Page 8, line 9. Rephrase so it reads: “the period term of the two stations, both show relatively the same changing tendency, which.....”
Answers: We have rephrased it into “...the period term of the two stations, both show relatively the same changing tendency, which...” in Page 8 Line 11 and 12.
11. Page 8, line 11. Change text such that “The GPS04 station belongs to part I ” reads “The GPS04

stations monitors the first part of the landslide”.

Answers: We have rephrased it into “The GPS04 stations monitors the first part of the landslide.” in Page 8 Line 13 and 14.

12. Page 8, line 12. There are a large number of people living there.

Answers: We have rephrased it into “a large number of” in Page 8 Line 14.

13. Page 8, line 13. Change text such that “The GPS03 station belongs to part III.” Reads “Station GPS03 monitors part III, the upper part of the landslide (Fig. 3).”

Answers: We have rephrased it into “Station GPS03 monitors part III, the upper part of the landslide (Fig. 3).” in Page 8 Line 15 and 16.

14. Page 9, line 4. Add “a” so it reads “... method offers a better forecast...”

Answers: We have added “a” in Page 9 Line 6.

15. Page 9, line 8. “execution time of the two methods...”

Answers: We have rephrased it into “...the two methods...” in Page 9 Line 10.

16. Page 9, line 24-25. The reference to google earth to figure 2 and rewrite to something like: “Map obtained from Google Earth”.

Answers: We have added “Map obtained from Google Earth” in Page 14 Figure 2.

17. Page 21, table 3. Write out the abbreviations so the table can be understood without reading the paper. So: “Comparison of Mean Absolute Error (MAE), Mean Squared Error (MSE) and Root Mean Square Error (RMSE) performance...”

Answers: We have rephrased it into “Mean Absolute Error (MAE), Mean Squared Error (MSE) and Root Mean Square Error (RMSE)” in Page 21 Table3.

We greatly appreciate your help concerning improvement to this paper. We sincerely hope this manuscript will be finally accepted. Thanks again for your help.

With best wishes,

Yours sincerely,

Nie