

***Interactive comment on* “A comparison of the soil loss evaluation index and the RUSLE Model: a case study in the Loess Plateau of China” by W. W. Zhao et al.**

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Reviewer: Based on page 2423, lines 19 to 23, the spatial land use factor was considered as part of soil index model. However, land use wasn't considered due to lack of data. This most important factors in the model was missing, how come authors were still able to conclude what areas in the watershed need to be optimized are the cause of improper land use? Without the land use data factored in the model, the simulated results are pretty much decided by other factors. Any explanations?

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Authors: In the model of SLsw, the C factor from RUSLE is selected to reflect the effect of different land use types on erosion rates. During the SLsw factor calculation process, the land use information has been taken into account. Because the C map layer had been calculated in the paper by Fu et al. (2005), this paper has not give the detailed calculation procedure of C map.

Reviewer: The two models came up with different significant soil loss areas. Authors concluded the significant soil losses occur in the middle and southeastern parts of the watershed (page 2425, lines 14 to 15). Somehow, authors just decided the middle area is the sensitive area (see page 2411, line10 and 11) and did not address why the southeastern part is not.

Authors: If one area has high SLsw value, it means that the land use pattern will lead to high soil loss rate. The southeastern part has high soil erosion modulus, but low SLsw value, which means it is the other factors, such as rainfall, topography and soil, not the irrational land use pattern, leads to high soil erosion for the southeastern part. So, the southeastern part is not the sensitive area for land use pattern adjustment. While, the middle parts of the watershed has high SLsw value and soil erosion modulus; so the middle parts should be the sensitive area for land use pattern adjustment.

However, combined the suggestions of reviewers, the research contents will discuss the relationship between soil loss evaluation index and the C factor from RUSLE, the comparison of SLsw and RUSLE result will not appear in the revised manuscript.

Reviewer: Authors seem mention several times that the RUSLE model predicting the annual soil loss rate and does not identify the locations/ area. If an area had a high soil lose rate, shouldn't it be considered as a problem area?

Authors: There are several factors which can lead to high soil loss rate, such as high intensity storms, steep slopes, erodible soils, and the irrational land use. For an area

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with high soil loss rate, it is difficult to say which factors lead to the high soil loss rate. It should be considered as a problem area for the high soil loss rate, but may not be the sensitive area that need land use pattern optimization.

The target of SLsw is to identify where land use need to be change for controlling soil erosion. In order to compare the difference of SLsw and RUSLE, the original manuscript stressed that the area with high soil loss rate may not be the sensitive area that need land use pattern optimization.

Reviewer: Authors provide quite some discussions (see introduction section) on the multiple scale index and ended up using the sub watershed scale index because it was a comprise between slope and watershed scales. This choice does not appear to be scientifically based. A 7,725km² Yanhe watershed sounds more like a regional watershed. Authors may consider better reasons to justify such a choice.

Authors: The area of Yanhe watershed is 7,725km² indeed. While, the watershed was divided into 820 sub-watersheds in the manuscript, and the mean area of the sub-watersheds was 9.42 km². SLsw is suitable for sub-watersheds.

Reviewer: It is review's suggestion that, considering the lacks of land use information and model verification, the paper probably should focus on the methodology and comparisons with RUSLE, instead of trying to make some conclusions on which areas are sensitive. Identifying such areas could be an effort towards future studies.

Authors: We are thankful for this suggestion. While, because the SLsw methodology has been published(Fu et al., 2006), it may not a best choice to focus on the SLsw methodology and comparisons with RUSLE. Combined the suggestions of reviewers, the revised manuscript will focus on the comparison between SLsw and the C factor from RUSLE. The conclusions on which areas are sensitive will not be made. It will be an effort in the future studies.

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For the comments in hessd-9-C613-2012-supplement.pdf

Reviewer: Page 2409, "soil loss evaluation index" was used in many places throughout the paper. Suggest using an acronym.

Authors: Yes, the acronym will be used for soil loss evaluation index in the revised manuscript.

Reviewer: Line 5 page 2410, This sentence appears to indicate the purpose of this study, but it was not thorough. Comparison with other model does not justify the limited application of the index model. Instead it could help verifying if the new model is sufficient (with limited applications and verifications) by comparing with the well accepted model. The objective of this study need to be clearly addressed in the abstract.

Authors: On one hand, the sentence in line 5 page 2410 will be revised to indicate the purpose of this study clearly. On the other hand, this comment gives authors one new thought: in the future research, SLsw should be verified by comparing with some well accepted model.

Reviewer: Line 16 page 2410, spatial analyst is a GIS extension that includes many functions/applications. Did you use several extensions or several functions in one extension?

Authors: We have used several GIS extensions in this paper. The sentence should be changed into "several extensions within geographic information system (GIS), especially the spatial analyst extension, are used to calculate these factor layers".

Reviewer: Line 13, 26, 28, page 2410; Line 1 2411. Four "namely" were used in the abstract. Consider using "i.e.," to replace some of them.

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Authors: Some of “namely” will be replaced by other words.

Reviewer: Line 3 page 2411, Wouldn't an area with higher soil loss rates indicate a problem? Line 26 page 2412 Why the areas with the most significant soil erosion may not require an urgent adjustment to the land use pattern.

Authors: Yes, if an area had a high soil loss rate, it should be considered as a problem area. But, it maybe not the land use leads to high soil erosion. The detailed reasons have been discussed above.

Reviewer: Line 11 page 2411, How come the southeastern part is not considered as part of optimization?

Authors: Because the SL_{sw} value of southeastern part is not higher. The detailed reasons have been discussed above. In the revised manuscript, the sensitive area or non-sensitive area will not be discussed.

Reviewer: Line 15 page 2414, It appears what scale to be used can't be decided?

Authors: the sentence will be revised, and the small watershed scale will be given.

Reviewer: Line 25 page 2416, Which point for “certain point”? Be specific.

Authors: where D_i is the soil loss horizontal distance index of the i point in the small watershed,

Reviewer: Line 4 page 2418, Please remove those crossed-out texts since they either repeat previously discussed or are unnecessary. Using the room briefly discuss the upscaling methods.

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Authors: Yes. The sentence will be removed, and the upscaling method will be introduced briefly.

Reviewer: Line 18 Page 2422 Incorrect. SLsw does not need a conversion.

Authors: Slsw value will not be converted in the revised manuscript.

Reviewer: Line 24 p2423 "so the land use wasn't really taken into account?"

Authors: In the equation of SLsw, C is used to reflect different land use type on soil loss. And Land use had been considered.

There are some other comments in hessd-9-C613-2012-supplement.pdf which had been mentioned in the first and second-round review comments.

Authors: These comments have been answered, and will not be repeated here.

There are some comments on language errors in hessd-9-C613-2012-supplement.pdf.

Authors: The language errors will be revised based on the review comments.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 2409, 2012.

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