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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Climate change, vegetation restoration and engineering as a 1 : 2 : 1 explanation for reduction of suspended sediment in southwest China" *by* X. Ma et al.

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Anonymous Referee #3

General comments: The manuscript describes a case study to attribute the reasons for the reduction of sediment in China. The topic is relevant to HESS and carries some interesting findings. From my experiences of working intensively on hydrological models and climate science, I feel the methods reported here is poorly described, and the attribution part is especially weak. The authors should address these comments before moving to the next phase. I recommend this manuscript to be major revision.

First, the calibration of the SWAT model, based on the manuscript, was done manually, which could be problematic. There are nice parameters related to this process, and there were no analyses for the sensitivity of these parameters. It is hard to justify the parameters used here are anything close to reality. And the authors said in line 18 of page 12430 that these four parameters are most sensitive, and I strongly suggest the authors show some results for the sensitivity of these parameters for simulating the sediment and hydrology.

A: The hydrological parameter sensitivity analysis had been done before which was published in the paper (Ma et al., 2009). When we do sediment simulation, we selected the parameters according to other published results, and did do so some sensitivity analysis for each parameter, then select the more sensitive parameters to manually calibrate the model. According to the comment from the reviewer, we will try to do more work on the parameter sensitivity analysis and show the results in our paper.

Second, the attribution equation (line 5 of page 12430) is very confusing. I may understand (SimulatedL2C2-SimulatedL1C2) only differ in land cover, thus could be interpreted as [land use change effect]; the same for (SimulatedL1C2-SimulatedL1C1) be interpreted as [climate change effect]. However, I do feel confused of the interpretation of (Measured2-SimulatedL2C2) and (SimulatedL1C1-Measure1). I could not link anything here to the [engineering effects] and [model bias]. Either the authors' explanation in the text is poorly structured and causes confusion, or there was a scientific flaw in this equation. Thus I am not convinced about this results and conclusion of "1:2:1" unless the authors clarify these confusion.

A: In the equation, the difference between SimulatedL1C1 and Measured1 explained the model bias; and the difference between SimulatedL2C2 and Measured2 explained the effect of engineering plus the model bias. During the period 1, there is less human intervention affecting the soil erosion and transportation except one middle reservoir, which was already considered in the modeling, so the difference between the simulated and measured illustrate the model bias. During the period 2, different controlling

engineering projects and other human activities was occurring, and the simulateL2C2 only considered the effect from land cover change, so the difference between the SimulateL2C2 and the Measured2 can explain the contribution from other engineering's effect. We will recheck the explanation in the text and make it clearer.

Finally, the major goal of this work is to attribute sediment change, as clearly shown in the title. However, there is only tiny part (only section 4.4, less than 10% of the whole manuscript) in the whole manuscript that truly addresses this major goal. This makes me even more worroid about the results. Either the authors put too much beforehand (such as the anecdotal description of changes in conservation program or human activities), or the results are too insignificant for any further justification and discussion. Either way, the authors are required to rearrange their manuscript (first present their results and then to interpret them by citing evidences) and strengthen the main part of the analysis related to the attribution. One thing to note is that the manuscript has no "Discussion" part, or it has been clumped with "Results". However, putting the most important results that briefly at the end of your "results" and directly followed by "Conclusion" is really bothering me.

A: The current manuscript still inherited the style of PNAS that wants conclusions first and detail of methods later, we can rearrange the structure according to the comments from the reviewer.

Specific comments:

1. The title could be changed. Suggest changing to something like "attribution of the reduction of suspended sediment in southwest China"

A: We think the presenting title is more clearly to demonstrate the attribution from different factors, we prefer to keep it.

2. line 6 of page 12418: policy debate -> policy making

A: We agree that policy making is more accurate than policy debate.

3. line 10-19 of page 12420: there are too many objectives, please simplify them, or please address them each by each and summarize them in the conclusion.

A: We agree it. This paragraph will be rearranged.

4. line 4 of page 12424: please define SSY for its first use.

A: We will add the definition for SSY.

5. line 5 of page 12425: what do you mean by "warming up"? Do you mean "spin-up"?

A: "Warming-up" is a short period for the model to simulate getting reasonable result which is similar to "spin-up".

6. Please show a figure for the land cover change, ideally showing the 5 maps of the land cover change in the region. It is very important to have this visual evidence for this part.

A: We will add one more figure to show the 5 land cover maps.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 12417, 2013.