

Interactive comment on “Impacts of land use/cover change and reforestation on summer rainfall for the Yangtze River Basin” by Wei Li et al.

Anonymous Referee #2

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The manuscript by Li et al “Impacts of land use/cover change and reforestation on summer rainfall for the Yangtze River Basin” used the WRF model to investigate how land cover changes and reforestation affect summer rainfall. The research topic is important given the massive ecological projects in China and its climate impact is worth studying. The manuscript is generally well-written, but I also have major comments for the authors.

1. For WRF model simulation, how land cover changes were implemented in the model needs more detailed explanations as different land surface models have different representations of land cover. It is still unclear what surface conditions/variables had been modified for the Noah-MP model to correctly reflect the intended land cover changes. I also have questions about the rationality of the randomly chosen crops for the two

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restoration scenarios. 2. When comparing simulation results between different experiments, the authors need to conduct statistical significance tests to determine whether the signal is robust while excluding any noise and random changes which may lead to misinterpretation. 3. I hope the authors could provide more mechanistic explanations of the results. For example, why did the 20% reforestation result in more precipitation changes than the 50% reforestation scenario?

Specific comments: L9: There is another terminology “Grain for Green” frequently used in the literature for “Returning Farmland to Forest Program”. Which one is better acknowledged? L130-140: What kinds of WRF experiments have been conducted to compare different schemes/parameterizations, what domain and simulation length was used for the comparison experiments?

L145-149: It is better to also report the quantities of land cover changes between 1990 and 2010.

L148: How did the random changes from cropland to forest being incorporated in the model surface land condition at 15 km resolution? I am not sure whether this choice is necessary. What land variables had been modified to represent the land cover change in WRF model and what are their changes? What types of forest were used in the reforestation experiment? How many grid boxes experienced land cover change?

L170: What about statistical significance levels of these precipitation changes? This needs to be reported for this and other figures as well.

L224: Why did 20% and 50% reforestation grids at the model resolution are different?

L241: For this section, the overall decreases in both LHF and SHF after reforestation were unexpected to me. Not sure if these changes are robust enough. Typical, ET would increase after reforestation, as described in the introduction, so how to explain this result?

L259: What about the changes in near-surface air temperature? For example, 2m air

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temperature.

L276-277: Any evidence to support this argument, given the latent heat flux decreased?

L296-297: How many urban grids had changed between 1990 and 2010? Whether urban expansion will affect the entire Yangtze river basin?

L332: Is there actual data to support the increased water vapor mixing?

L335: Why is the precipitation response larger in 20% than in the 50% scenario? There is no related explanation or discussion.

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