

# ***Interactive comment on* “Effects of environmental and management factors on worldwide maize and soybean yields over the 20<sup>th</sup> and 21<sup>st</sup> centuries” by Tzu-Shun Lin et al.**

## **Anonymous Referee #1**

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Lin et al. Effects of environmental and management factors on world-wide maize and soybean yields over the 20th and 21st centuries.

This manuscript reported past-present-future crop production with focus on maize and soybean using a numerical model simulation. The authors used ISAM model (which is widely applied in many studies) to simulate production with time-variable inputs of climate, atmospheric CO<sub>2</sub>, N input, irrigation, and harvest area at global scale from 1901 to 2100. Changes in climate and human activities and its effects on crop production is important topic, and model projection work is clearly important.

There're some existing and collaborative studies, called AgMIP (and others), as listed in

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this study. This study tries to go further from AgMIP, and try to understand interactions between environmental (natural) factors and human factors. Target of the study is good, and relevant to BG.

However, when I read the manuscript, there're some concerns and a substantial amount of major comments. At the present stage, I cannot recommend it for publication. Even if my comments to model setup is incorrect, this manuscript requires re-read, re-write, and re-check by co-authors. It requires substantially large modification from beginning to end.

Major comments

Paper Preparation.

The manuscript is not ready for submission. There are many typos and simple mistakes. I can easily find (e.g. grammatically incorrect) such sentences. I strongly suggest the authors check this manuscript from beginning to end and improve description. In addition, too many figures (15 figures and many tables) in supplemental materials are cited in the result section (Much of results section are supported by supplemental figures). Therefore, it is unfair as a peer-reviewed articles. These supplemental figures are referred from the main text but main text lacks sufficient explanation and interpretation of the figure. These should be improved.

Model Setup

In the experiments of sensitivity check, the authors conducted many experiment with one input time-invariant. In the experiment, the authors set 1901-1920 values for 1901-2005 simulation and 1996-2006 values for 2006-2100 simulation. If the description is true, I have serious concern of the model outputs. If we consider atmospheric CO2 concentration as time-invariant parameter, model run was conducted using 1901-1920 CO2 concentration for 1901-2005 and 1996-2006 CO2 for 2006-2100. This setup include large jump of CO2 concentration, and this may introduce unrealistic jumps of

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outputs around 2005. So, in my guess, results on future changes contain large biases caused by jump of input parameters for sensitivity tests. This should be avoided.

### Interpretation of Results

Manuscript contains many figures (in main text and supplement). However, these figures were not well-evaluated and discussed in the main text. I believe these figures contains many important implications. However, this manuscript fails on this point.

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