Review Comments on the Manuscript MS 854

"Chinese Food Security and Climate Change: Agriculture Futures"

This paper provides a valuable addition to the discourse on examining the socioeconomic impact of climate change on agriculture in China using an integrated modeling approach. One potentially significant contribution of the paper lies in the fact that it looks at interactions between international agricultural trade and climate change in China. For example, it concludes that the facilitation of international agricultural trade may well offer a useful climate adaptation measure for the country under consideration. As China represents a large country case and as the Chinese food market is also closely linked with the global market, it is important to consider global food production and demand. The IMPACT model is global in nature and well-suited to assessing the impacts of climate change on crop production, crop choice, and crop distribution through trade. Unfortunately, the results are somewhat buried in the conclusion. There is no explicit discussion of this potentially important point in the modeling part. The earlier paper using the same IMPACT model, however, has more prominently displayed these findings. The reference is as follows:

Gerald C. Nelson, Liming Ye, Kevin Chen, Daniel Mason d'Croz, Amanda Palazzo, Nicholas Magnan. Chinese Food Security and Climate Change: Agriculture Futures, Final Report submitted to the World Bank, August, 2011.

It is important for the authors of the current paper to clarify the relationship with the above-mentioned study.

The paper also reaches an interesting conclusion that climate change does not seriously affect China's national food security (in terms of its grain self-sufficiency). Several recent socioeconomic studies have reached similar conclusions. One needs to be careful, however, when interpreting these results.

It should not be interpreted that climate change does not significantly affect China's food production. Rather, with socioeconomic models, automatic adaptation measures are sometimes implicitly imposed and therefore the impact of climate change would be modified downwards.

There are also a number of clarifications that the paper needs to make. First, it is well known that Chinese agriculture faces a tremendous challenge in regards to the availability of water resources. Climate change is anticipated to change the frequency and amount of precipitation of intense climate events across the nation. It appears that water is not a part of the modeling at all. Given its central importance, some justifications should be provided. Second, like many other works on the same subject, uncertainty is the largest challenge in predicting climate change impacts. For agriculture related work, CO_2 fertilization effects are a critical consideration. In this paper, though CO_2 fertilization effects are mentioned in but a couple of places, it is not clear how those effects are treated in the model. Third, GDP growth could play a significant role in assessing the impact of climate change. The projections on China's GDP appear very problematic as they are based on much lower starting numbers what is used or generally predicted by analysts. It would be interesting to see how a more realistic GDP projection might change the results. Fourth, there have been a number of economic studies on the impact of climate change on China's agricultural production in recent years. Many of these are not cited here. A thorough literature review needs to be done.

The paper is very long for a typical Journal article and needs to be shortened substantially – perhaps by half. For example, many maps could be taken out. The introduction and background on China's food security could be tightened. Moreover, discussion on mitigation appears unrelated to the modeling exercises and could be taken out as well. A number of policy recommendations in the conclusion appear unrelated to the analytical work and should be eliminated.