Response to RC1:

In this manuscript, the risk assessment of agricultural drought was conducted and investigated using the drought hazard intensity index and physical vulnerability curves.

The manuscript is overall well-written. However, I believe the manuscript cannot be accepted for publication until the following concerns are properly resolved:

1. In case study, the EPIC model was used to predict daily water stress. However, the EPIC model was not seriously introduced at all. An independent section and the corresponding literature reviews should be added to provide sufficient information of EPIC.

Comments of reviewer are very valuable. A short description about EPIC and the corresponding literature reviews has been added in Section 2.2.1.

EPIC model is a field-scale crop model, which is capable of simulating daily crop growth, calculating crop yield under various climate and environment conditions and performing long-term simulations for hundreds of years (Gassman et al., 2005). In recent years, EPIC model has been applied in different fields, including climate change (Izaurralde et al., 2012; Rinaldi and De Luca, 2012), simulation of crop yields (Pumijumnong and Arunrat, 2013; Xiong et al., 2014) and drought disaster risk assessment (Jia et al., 2012; Wang et al., 2013b). In previous study (Wang et al., 2015)，a new method was proposed to determine drought hazard intensity index based on the daily water stress from EPIC model and yield loss contribution rates for different growth stages. In this study, the risk assessment of agricultural drought was conducted from the physical vulnerability curve.

2. Most figures (Figures 1, 5-12) are in poor resolution. Please enhance the quality of figures.

I am sorry for the poor resolution of figures. Because of the limitation of WORD, figures with high quality will cause the file become too large. All the figures with high resolution will be uploaded as the attachments for the final version.

3. I believe most people know the location of China but I suggest adding a map of China along with the studies area in Figure 1.

A map of China along with the studies area has been added in Figure 1.

4. How do you define “Northern China”? As far as I know, some parts of “Northern China” were not included in this study. Proper justifications should be addressed in the next revision.

Generally speaking, there is no precisely definition of Northern China. But a geographical dividing line between northern and southern China which is named the Huai River–Qin Mountains Line is often used to define northern and southern China. However, in this study, the study area is the farming-pastoral ecotone in Northern China. There exist many different definitions about the farming-pastoral ecotone in northern China. In general, it is located at the north part of China with the rainfall isoline changing from 300mm to 400mm, annual precipitation change ranging from 15% to 30% and dryness changing from 1.0 to 2.0 (Zhao et al., 2002).

5. In conclusion, what will be message to the general public by the proposed work? What could be the limitation(s) of the proposed work? What might be improved in the future based

on the proposed work? The conclusion should be substantially revised accordingly.

We thank the reviewers for the suggestions. Some revision has been made in discussion and conclusion part.

The risk assessments showed the farming-pastoral ecotone in Northern China is a region with high risk of agricultural drought and high sensitivity to climate change. Three different parts showed different spatial and temporal distribution of drought hazard intensity index and yield loss ratio. Drought is one of the most manifestations of climate variability in this region and severe droughts are becoming more frequently in recent years. To better adapt to drought, measurements can be taken based on the risk assessment in this study: to reduce the drought hazard intensity, the planting environment can be changed like improving the ability of irrigation or changing soil property through fertilization and other tillage methods. To reduce physical vulnerability of crops to agricultural drought, improved varieties of crops can be developed to promote drought-enduring and drought resisting crops. To reduce crop's exposure to drought, planting structure can be adjusted during the planting process.

The uncertainty of this study mainly comes from the simulation of EPIC model and the construction of physical vulnerability curve. For EPIC model, the uncertainties are from the model itself and input data like meteorological data, soil data and field management data. For the construction of physical vulnerability curve, the uncertainty is mainly due to the limitation of selected sceneries.

For the further study, a larger study area including south and north part of China will be selected to better assess drought risk and describe the impact of climate change to agriculture along different latitudes.