Response to SC2:

Manuscript Review of nhess-2016-204: Study on the drought risk of maize in the farming-pastoral ecotone in Northern China based on physical vulnerability assessment I would recommend that this manuscript be published after moderate revision. Please find my comments below.

General comments

This paper presents a study on the drought risk of maize in the farming-pastoral ecotone in Northern China. The novelty of the work is to conduct a physical vulnerability curve based on the relationship between drought hazard intensity index and yield loss rate. The study is generally well organized and presented.

However, there are several issues which need attention before publication.

1) In the abstract, the authors should offer some quantitative results and conclusions.

Comments of reviewer are very valuable. Some revisions have been made in abstract.

2) The description of ecotone in 2.1.1 should be shortened and most of the section should be moved into the section of introduction.

The description of ecotone in 2.1.1 has been modified and moved to introduction part.

3) China meteorological data sharing service system of China only offers sunshine hours. So, how to transfer the sunshine hours to global radiation?

Daily solar radiation information was recorded in 27 stations. The daily solar radiation data for the remaining stations were estimated based on the sunshine duration data using the Angstrom-Prescott model (Angstrom, 1924;Prescott, 1940)

4) The authors should offer the genetic parameters of maize used in the EPIC model for the three sites in Fig.3. Moreover, please provide the station name of six validation sites.

The genetic parameters of maize for three sites have been listed below. The six validation sites are Chifeng, Tongliao, Zhangjiakou, Jining, Guyuan and Dingxi.

Parameter name	Meaning of parameter	Baicheng	Datong	Yulin
WA	Energy- biomass conversion factor	37	39	44
HI	Harvest index	0,6	0,5	0,65
TB	The most suitable temperature for crop growth (℃)	25	25	25
TG	The lowest temperature for crop growth (℃)	5	5	5
DMLA	The maximum potential leaf area index	7	7	7
DLAI	The ratio of LAI downward stage accounted for the growing season	0,18	0,2	0,15
DLP1	Crop area growth curve parameter 1	15,05	15,05	15,05
DLP2	Crop area growth curve parameter 2	50,95	50,95	50,95
RLAD	Leaf area index decreasing parameter	0,1	0,1	0,1

5) Please provide sowing date of maize, planting density of maize, fertilization amount used in running EPIC model at three representing sites under sufficient and no irrigation conditions.

The sowing date of maize is set to be April 25th (Baicheng), April 15th (Datong) and April 10th (Yulin) separately based on the Chinese Planting Information Network (http://www.seedchina.com.cn/). Planting density and fertilization amount are set to be automatic mode in EPIC model.

6) The linear regression curve seemed more appropriate to fit the data than the logistic curve. So, why you select the logistic curve as the physical vulnerability curve?

Here we chose logistic curve instead of a straight line to simulate physical vulnerability curve because logistic curve can be used to describe the drought hazard intensity dependent biphasic effect of maize physical vulnerability to drought disaster. At the beginning and the end of the curve, the slope is small. This means for both low hazard intensity and high hazard intensity, the increasing of drought hazard intensity has relatively small impact on the yield loss ratio. However, for the middle part of the curve, the slope is large. This means for middle hazard intensity, the increasing of drought hazard intensity will have larger impact on the yield loss ratio. In this study, restricted by the meteorological data, it was hard to include every different meteorological scenery in theoretical like extreme drought (H = 1) or no drought (H = 0) to simulate a real physical vulnerability curve to drought hazard of spring maize. In addition, errors from meteorological data and the model itself might also have impacts on simulation results. So considering the accuracy of the input data and some uncertainties during the calculation process, the simulated drought physical vulnerability curve of spring maize for each part was satisfied.

7) The discussion section should be strengthened by comparison with previous studies, including the impact of drought on spring maize in the farming-pastoral ecotone, the measures used to adapt to climate change, etc. Moreover, please have a native speaker to improve the English of the text. Therefore, I would recommend that this manuscript be published after moderate revision.

We thank the reviewers for the suggestions. Some revisions have been made in disscussion 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.

Other minor comments I suggested that the title should be changed into “The drought risk of maize in the farming-pastoral ecotone in Northern China based on physical vulnerability assessment”.

P1L10: Make “4” as superscript.

P1L21: What does magnify and reduce function mean?

P1L22-23: Delete the sentence because it is obvious. P2L31: Change “response to” into “tackling”.

P2L44-L45: The references should be listed in chronological order.

P24L536: Missing the volume and page number of the publication.

P3L67: Change “Uzielli et al. (Uzielli et al., 2008)” into “Uzielli et al. (2008)”.

P3L70: Change “Douglas (Douglas, 2007)” into “Douglas (2007)”.

P3L73-L74: The references should be listed in chronological order.

P3L75: Change “factor” into “factors”.

P3L77: Change “Wang et al. (Wang et al., 2013)” into “Wang et al. (2013)”.

P5L158: Change the caption of Table 1 into “Meteorological, soil and relative agricultural data”.

P7L162: “CH”, “CV”, “CE” should be consistent with Eq.1.

P10L221ïijŽ delete “to” before “the water stress”.

P11L48: change “represent” into “representive”.

Table 2: change “filling” into “grain-filling”.

P12L270: Change “Wang et al. (Wang et al., 2015)” into “Wang et al. (2015)”.

The reviewers are correct about some minor issues. We have accepted and revised all minor issues (include the words and figures) in the manuscript. And some repetitious part of the manuscript has been cut and refined.