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Memo: response to the reviewer's comments concerning "Predicting the Texas Windstorm Insurance Association claim payout of commercial buildings from Hurricane Ike"

Issue	Response/Correction
Reviewer #1	
General Comments: 1. The research addresses an interesting and valuable issue, that of predicting hurricane damage. 2. I have some issues related to the methodology that should be clarified or addressed prior to publication.	The authors would like to first thank the editor who allowed us opportunities to revise and resubmit the paper. We also sincerely appreciate the anonymous reviewer who provided thorough reviews and valuable comments to help us improve the manuscript. We strongly believe that in the revision we have fully addressed all the reviewer's comments and concerns and carefully revised the manuscript based on the feedback we have received. Please see the following sections below responding to each reviewer's comments. Thank you again.
3. The literature survey should include reference to other hurricane damage models such as HAZUS or RMS or EQE.	As the reviewer points out, the developed model from this paper can be necessary to compare other hurricane damage models such as HAXUS or RMS or EQE. In this study, however, the primary focus has been on the investigation of actual damage of the hurricane, which is the scope of this study. In the future, we are planning to prepare a companion paper that addresses this issue including the comparison with other models into account. Thank you so much for your suggestion.
p3814, ln 22-25, "Natural disasters in the US have been increasing because abnormal weather and climate change have stimulated severe weather events." Most of the increase can probably be attributed to social and demographic changes, particularly development in hazardous areas.	As the reviewer points out, We think that most of the damages can probably be attributed to social and demographic changes. Therefore, the sentence has been added on page 3814. "…Damages from natural disaster in the US have been increasing. Especially, most of the damages can probably be attributed to social and demographic changes of development in hazardous areas.…"
P3815 ln 1-2 "Furthermore, this rapid increase in disaster events has caused unavoidable damage to property and infrastructure during the past five decades." Much of the damage is avoidable, through land use planning and appropriate construction techniques.	As the reviewer points out, although much of the damage can be avoidable by land use planning and appropriate construction techniques, according to Cutter and Emrich (2005), the direct cost was estimated over 7.6 billion dollars per year. The following sentence has been inserted. "….Although much of the damage can be avoidable by land use planning and appropriate construction techniques, this rapid increase in the disaster events has caused the damage to property and infrastructure during the past five decades. According to Cutter and Emrich (2005), the direct cost was estimated over 7.6 billion dollars yearly (Cutter and Emrich, 2005).…"

P3815 ln 4-5 "This estimate does not cover indirect costs such as insurance compensation from the US government or indirect costs to companies and individuals." Insurance compensation is not actually a cost, but rather a risk transfer mechanism. It relates to who pays the cost, not the cost itself.	As the reviewer points out, since the insurance compensation is not actually a cost, the sentence has been deleted in this paper. *"...This estimate does not cover indirect costs such as insurance compensation from the US government or indirect costs to companies and individuals..."*
P3815 ln 5-7 "Moreover, Hurricane Andrew, in August 1992, created insured losses of $150 million in a single event (Boissonnade and Ulrich, 1995)." I would refer to Hurricane Katrina, which surpassed Andrew.	Thank you for your suggestion. The data of Hurricane Andrew has been changed the data of Hurricane Katrina. *"Moreover, Hurricane Katrina, in August 2005, created insured losses of 40 to 60 billion dollars in a single event.* Reference CRS Report for Congress(2005) http://assets.opencrs.com/rpts/RL33086_20050915.pdf
P3819 ln 9-10 "FEMA designated flood zones based on the level of flood risk (Howard and Scott, 2005)." are	Done.
P3820 ln 2-3 FEMA Flood Zones, Hurricane Surge Zones, and distance from water should all be integrated into the hurricane damage prediction model as geographical vulnerability indicators. These are not independent parameters. How dependent are they, and what influence will that have on your correlations?	We believe that these are independent parameters. FEMA Flood Zones are defined based on the level of flood risk. Hurricane Surge Zones are defined based on the sustained wind speed and surge height. Distance from water is measured base on the location of building. We conducted correlation tests with these indicators, but these were not highly correlated. In addition, since the range of the Variance Inflation Factor (VIF) is from 1.130 to 2.208. All the results confirm that the indicators are independent.
P3821 ln 4-6 For example, wind parameters play a key role in hurricane damage and cause related disasters such as floods, hurricane surges, and landslides. It is fair to say wind causes storm surge, but it is quite a stretch to say it causes floods and landslides.	Thank you for your comment. We revised the sentence as follows: *"....For example, wind parameters play a key role in hurricane damage and cause related hurricane surges...."*
P3822 ln 4-6 The difference occurs because of the differences in wind intensity and direction on either side, due to the interaction of the two opposing actions of a hurricane (i.e.	Thank you for your comment. As you points out, the forward movement and the counterclockwise rotation are different concepts rather than opposing actions. We revised the sentence as follows:

forward movement and counterclockwise rotation). I would not describe them as opposing actions.	*"….The difference occurs because of the differences in wind intensity and direction on either side, due to the interaction of the two different actions of a hurricane (i.e. forward movement and counterclockwise rotation)…."*
P3822 ln 16-19 The goal of this model is to predict the insured claim payout. The dependent variable, the Texas Windstorm Insurance Association (TWIA) claim payout ($), can be predicted by the independent variables, as shown in Eq. (1) As mentioned above, I doubt that all the parameters are independent.	We conducted Pearson's and Spearman's test to show the relationships among the indicators, the results showed that these parameters are not highly correlated. Since the values of VIF are that the surge zone for 1.741 and the distance from the shore for 2.208, we believe that the indicators are independent.
P3822 ln 20-22 $PDL = \beta_0 + \beta_1 \cdot Wind\_Speed + \beta_2 \cdot Side\_Right + \beta_3 \cdot Age + \beta_4 \cdot Area + \beta_5 \cdot Imp\_Value + \beta_6 \cdot FEMA\_Zones + \beta_7 \cdot Surge\_Zones + \beta_9 \cdot Dist\_Shore.$ What exactly does PDL stand for? Do insurance claims distinguish between flood and wind damage for Hurricane Ike? It seems to me that mixing the two together reduces the predictability of the statistics. Wouldn't it make sense to have two separate equations, one for wind damage and another for flood damage?	PDL stand for Property Damage Losses. The damage records were mixed the wind damage and flood. The reason is that TWIA counted the damages as one. Hence, even if, predictability of the statistics might be reduced, we mixed the two factors together.
P3822 ln 20-22 $PDL = \beta_0 + \beta_1 \cdot Wind\_Speed +_2 \cdot Side\_Right + \beta_3 \cdot Age + \beta_4 \cdot Area + \beta_5 \cdot Imp\_Value + \beta_6 \cdot FEMA\_Zones + \beta_7 \cdot Surge\_Zones + \beta_9 \cdot Dist\_Shore.$ Should this be Beta8 What exactly is Imp_Value?	Thank you for your comment. β_9 has been revised to β_8. In addition, Imp_Value stands for Improvement value of building.
P3824 ln 13-15 The sign of the coefficients determine whether the relationship is positive or negative, and the coefficients indicate the amount of the linear relationship with a range of $+1$ to -1. The assumption of linear relationships	As the reviewer points out, the nonlinear regression can be more powerful alternative to linear regression but there are a few drawbacks. 1) The effect each predictor has on the response can be less intuitive to understand. 2) P-values are impossible to calculate for the predictors 3) Confidence interval may or may not be calculable.

needs discussion. I am sure some of the relationships are not linear in theory. For example, building age likely becomes increasingly important beyond some critical threshold, and damage as a result of wind speed is highly non-linear.	In this respect, the linear regression is used in this study. In addition, the purpose of this study is to identify the interrelationships among the indicators and TWIA claim payouts using a statistical method. Hence, we adopted the linear regression to analyze the data, which resulted in a global equation that allowed for an understanding of the relationship between dependent and independent variables. Reference Zim Frost (2011), http://blog.minitab.com/blog/adventures-in-statistics/linear-or-nonlinear-regression-that-is-the-question
P3826 ln 4-8 The adjusted R-square of 0.401 indicates that the transformed dependent variable can be explained 5 with 40.1% of variability by the significant variables (i.e. max. sustained wind speed, the right side of the hurricane track, building age, building floor area, appraised value of building, hurricane surge zones, and distance from the property centroid to shoreline). Just clarify that this is 'storm-relative' wind speed.	Thank you for your comment. The sustained wind speed has been revised to storm-relative wind. "Max. storm-relative wind speed"
P3828 ln 10-12 The range of the Variance Inflation Factor (VIF), from 1.130 to 2.208, also confirms that the individual predictors have no multicollinearity, which verifies that the predictors are not correlated with each other. I don't see how surge zone and distance from shore can be uncorrelated.	The values of VIF are that the surge zone for 1.741 and the distance from the shore for 2.208. The values are higher than the other indicators, but the values confirm that these indicators are not highly correlated.