Response to first referee's comments on "Understanding Spatiotemporal Development of Human Settlement in Hurricane-prone Areas on U.S. Atlantic and Gulf Coasts using Nighttime Remote Sensing"

By Xiao Huang, Cuizhen Wang and Junyu Lu

"The manuscript is well organized and the results are very encouraging. This manuscript is worth of being published, but the following comments would be helpful for the authors to improve the quality of the manuscript."

Our response: Thanks for your encouragement and your positive comments. Your suggestions are indeed helpful for us to improve the quality of this manuscript.

"General comments: Line 12, page 2: it would be helpful to provide some background information on how a hurricane is categorized, and explain how a category 5 hurricane looks like"

Our response: Thanks for your suggestions. We acknowledge that adding such information will benefit the readers. In the revision, we added some basic descriptions regarding the hurricane categorization: "Based on Saffir-Simpson Hurricane Scale, hurricane is categorized in five levels by its wind speed: 74-95 mph as Category 1; 96-110 mph as Category 2; 111-129 mph as Category 3; 130-156 mph as Category 4; above 157 mph as Category 5". In addition, we also stressed that category 5 is the highest category: "In 2016, Hurricane Mathew, a Category 5 (the highest category) hurricane, claimed a total of 34 direct deaths in U.S"

"Line 13, page 2: Rephrase "125 billion and 50 billion dollars of damage respectively", this is confusing. Is the total damage 125 billion dollars? Or Is 125 billion dollars a part of damage? Current expression is more like the second case. The same clarification is needed for the 50 billion statement."

Our response: Thanks for pointing out this issue. We acknowledge our description might cause confusion to the readers. We have revised the sentence as "In 2017, Hurricane Harvey in the Gulf coast caused a total of 125 billion dollars of damage, ranking the second costliest hurricanes in the U.S. In the same year, Hurricane Irma in the Atlantic coast caused a total of 50 billion dollars of damage, ranking the fifth costliest hurricanes in the U.S ("Costliest U.S. tropical cyclones tables updated", 2018)."

"Line 13, page 6: How is R determined? Based on what factors?"

Our response: We apologize that we didn't give enough information for the setting of circular neighborhood (R). For density calculations, a neighborhood size (or search distance) has to be

defined. We adopted the idea from the tool in ArcGIS called "Line Density" which calculates a magnitude-per-unit area from polyline features that fall within a radius around each cell. Here, we adopted the default setting of R in that function: "**The default is the shortest of the width or height of the output extent in the output spatial reference, divided by 30".** Per our calculation, the circular neighborhood R in our research area is 100 km. We added the setting of R in the revised manuscript as "The radius of R is set as 100 km in this study". We apologize for not specifying this parameter in the previous manuscript.

"Line 24, page 6: It would be helpful to make reference to Figure 3 when mentioning the referencing area."

Our response: Thanks for your suggestion. We added "Fig. 3a" to the sentence as "Serving as the reference site in that study **(Fig. 3a)**, the geographic area of metropolitan Los Angeles and City of San Diego, CA maintains high conformity of NTL values throughout the 22-year period (Kyba et al., 2017), which satisfies the "pseudo invariant" rule for calibration site selection (Elvidge et al., 2009)."

"Line 28, page 6: how many referencing lit pixels are used?"

Our response: Per our calculation, there are a total of 34,540 lit pixels (DN>0) in the reference site for our referencing satellite/year: F162007.

"Figure 3b2, page 10: this plot is very scattered as compared to the other two plots, any explanations?"

Our response: We believe that it is because F101992 is the very first satellite in the series. The long time interval from 2007 (our reference year) might lead to the scattered distribution pattern. However, we believe that the an R^2 of 0.946 still warrants a decent agreement for calibration. Our explanation in the manuscript is "The F101992 data (Fig. 3b2) exhibit less agreement due to its different satellite origin and a long time interval from 2007."

"Figure 4c, page 12: the level of the vertical axis is not correct."

Our response: We specifically select NDVI value above 0.1 to perform the intercalibration of MODIS and AVHRR. So, in the scatter plot, the origins should start from 0.1. In our previous manuscript, we illustrated: "A stratified sampling was applied to pixels with NDVI value above 0.1 to ensure that land covers in different NDVI ranges were equally sampled. A total of 30,000 samples were collected within four hurricane-prone zones in years 2003, 2004 and 2005."

"Figure 5, page 13: it is helpful to label which image is for 1992, 2002 and 2013."

Our response: Thanks for your suggestion. We labeled subfigures in Fig. 5. The new figure can be found here:
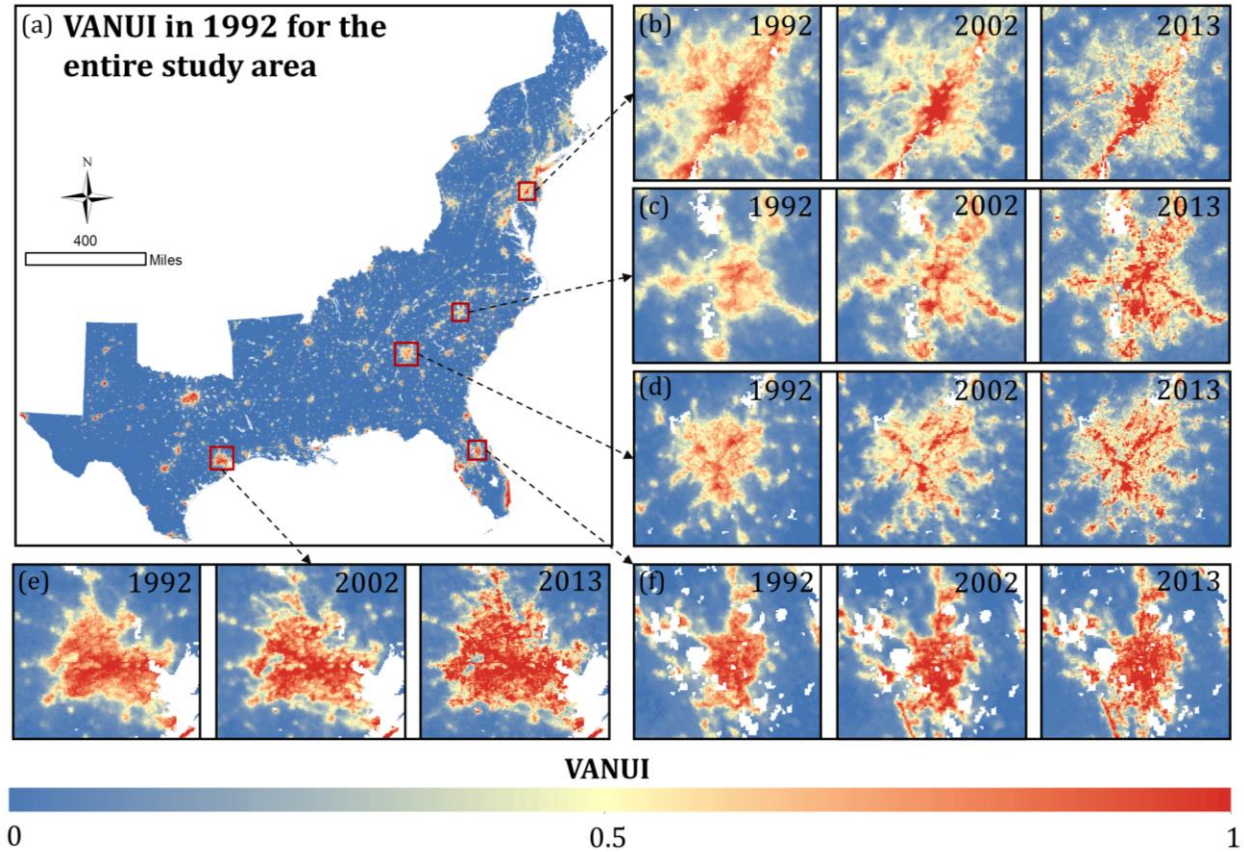
"Figure 7a, page 17: the ellipse is shown without being explained."

Our response: We explained the blue ellipse in our previous manuscript as "Decrease in human settlement intensity was observed mostly in the north (the U.S. Northeast region; **blue circle** in Fig. 7a) where several cities in state of New York stand out, including Albany, Troy and Johnstown." We changed "circle" to "ellipse" in this revision.

"Grammar errors can be found at some places though they don't prevent readers to understand the science of the paper. The following editorial comments could be helpful in this regards, yet it is unlikely that they are able to address all the language issues."

Our response: We really appreciate the grammar issue you pointed out in our manuscript. We have addressed all the grammar problems that have been pointed out. Before the submission of the revision, we will carefully proofread the document.