

## ***Interactive comment 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 et al.***

**Anonymous Referee #2**

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The paper presents an analysis of how and where human settlements increased across the USA in relation to hurricane locations using nighttime lights (NTL) from 1992 to 2013. The authors propose an alternative variable to NTL, VANUI – where NTL are linked to NDVI, to account for vegetation cover and also reduce the technical limitations of NTL data. Given the availability of time series, spatial and temporal dynamics are investigated, particularly focusing on hurricane-prone areas. The paper is relatively clearly written and I enjoyed reading it. However, before I recommend publication of this work, several clarifications need to be done. In particular, I do have one major

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concern that may cause a major flaw in your research.

\*\*\*To what extent the percentage of pixels with  $VANUI > 0$  is representative of an increased land development?\*\*\* If we look at the case of Philadelphia (Fig. 5b) the percentage does not significantly change from 1992 to 2013. What is changing here is the sum of VANUI values. Therefore, I strongly recommend to analyze the sum of VANUI to check for land development. If the sum of VANUI does not confirm your previous findings, then your analysis present a major flaw and cannot be accepted for publication.

\*\*\*Why sum slope to represent the rapidness of human settlement growth?\*\*\* Each pixel (1 km<sup>2</sup>) can have a maximum slope value of  $1/22 = 0.045$ . By summing slopes in a region, I assume that you can get an estimate of growth, but this is proportional to the considered area (namely, one of the four hurricane-prone zones), thus you cannot compare trends. To do this, you should consider the average slope.

\*\*\*To what extent sum of slopes in Table 3 are significant?\*\*\* I do have serious concerns related to the slope values reported in Table 3. If we assume that the maximum slope per pixel is 0.045 and in zone 1 there are 312,453 pixels (all starting from 0 in 1992 and reaching 1 in 2013), then ideally the maximum sum value would be 14,060. How is this value related to 9.02 (per 100,000 km<sup>2</sup>)? Please elaborate more on this, to prove the significance of slope values.

Detailed comments Page 5 L. 13: “resampled to the 1 km pixel size”. NTL are already at 1 km resolution.

Page 6 L. 20-21: categorization of hurricane-prone zones: what is the distribution of rho? You should consider (if not done yet) the frequency distribution of rho values to categorize zones.

L. 23-25: “Serving as the reference site in that study [Elvidge et al. 2009]. . .”. Elvidge et al 2009 considered Sicily as the reference site to perform intercalibration, not Los

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Angeles and the City of San Diego, as you stated in your manuscript.

L. 30: Why do you calibrate DN values if you employ NDVI values? Zhang et al 2013 use original DN values. Please justify this.

Page 7 L. 10: 30,000 samples – are 30,000 samples per year or 10,000 samples per year? Is this representative of the range of NDVI values within the study area? If I am correct, you examine 0.4% (if 30k in total) or 1.2% (if 30k per year) of pixel to intercalibrate NDVI values.

Eq. 5: “k-1” should be “k=1”. “j-k+1” should be “j=k+1”

Page 8 Eq. 6: “p-1” should be “p=1”

L. 9: add the meaning of Z=0 in this sentence

L. 24: Fig 2a instead of Fig 1a

Page 9 L. 1-4: Hew Hampshire is missing. Please add it to the list.

Page 14 L. 13-15: “With increased land development, . . .exposure.” You cannot state this without examining the sum of VANUI.

Page 15 Caption of Fig 6: what does “and the like” mean here?

L. 6: I suggest to cite Fig 7 here

Page 17 L. 1-3: how is this linked to the sum of slopes in table 3?

Figure 7: You show in gray the urban area as derived from NLCD – does it show a yellow mann-kendall trend(i.e. insignificant)?

Page 18 L. 12: “The three two years”: what does this mean?

Page 19 L. 15-17: You should tone down this sentence and verify if the sum of VANUI confirms your previous findings

References: Could you please list them in alphabetical order?

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