

Referee #1 reply:

Remark	Reply
<p><b>Major remarks</b></p> <p>Major remark concerning the correlation plots (Fig 9, pp. 17), detailed explanation: "If I am right, these correlation plot show both a spatial and temporal correlation (I suppose points represent yearly values within each sub-period for each county). However, spatial and temporal correlations should be considered separately. A possible solution could be to compute the temporal average in each sub-period and thus plot only 8 points. Also, a comparison against the variables in the whole period (2000-2012) is needed. The following paragraphs need to be fully revised and adjusted and final outcomes need to be checked before accepting the manuscript for publication."</p>	<ul style="list-style-type: none"> <li>• The referee correctly points out that the correlation plots show yearly values within each sub-period for each county. However, these values represent changes relative to the pre-Katrina level of their respective variables. That is, we index the change in night light intensity and the change in, say, population to 2004 (2004=100) for each respective county. As such, the plotted values are all changes relative to the 2004 level of their variable for their respective county.</li> <li>• If we understand correctly, the referee suggests to compute yearly averages of all 8 counties, to plot only one value per year. We have not done so, as we report substantial differences in impact of Katrina on counties' respective economic activity (as discussed in detail in sections 3.1 and 3.2). Averaging over these counties within years smooths out much of the variation of interest. Related to the bullet above, the indexation ensures that cross-sectional (spatial) differences in the level of light intensity and the level of the economic variables is controlled for. We propose to explain this more clearly in the revised paper.</li> <li>• If instead the suggestion is to compute averages across the entire sub-period (i.e. an average of all years per county per sub-period), we would lose most of the time-variation of the analysis. As we discuss in sections 3.1 and 3.2, the change in the variables of interest is rather heterogeneous over time even within the post-Katrina sub-period. As with the previous bullet, this would imply we lose most of the variation of interest.</li> <li>• Concerning correlation plots for the entire period 2000-2012: we deliberately make a distinction between the pre-Katrina (2000-2004) and post-Katrina (2005-2012) period. As discussed in the paper, the pre-Katrina period is characterized by a higher degree of top-coding. Changes in light intensity pre-Katrina are therefore driven by pixels below this threshold. As this is markedly different from the years post-Katrina, we separate the two periods. We can, however, report correlations for the whole period (2000-2012) in the appendix, if this is desired. As this combines the two periods, of which we observe rather weak correlations between light intensity and economic variables in the first period, overall correlations are lower but not qualitatively different from the reported correlations for 2005-2012.</li> <li>• Minor remark on Figure 9: these plots are indeed correct. The correlations are very weak and sometimes negative, exactly because of the reasons mentioned in the bullet above.</li> </ul>
<p>"... the paper is written in a very long and, somewhere, written in a convoluted way with several repetitions (especially in the introduction). I would encourage the authors to focus on key and relevant sentences and synthesize the whole manuscript in a more condensed version."</p>	<ul style="list-style-type: none"> <li>• We thank the referee for pointing this out and will revise the manuscript appropriately.</li> <li>• We agree that the discussion and conclusion can be merged and will pay special attention to condensing the introduction section.</li> <li>• Minor textual comments have been acknowledged and will be addressed.</li> </ul>
<p><b>Minor remarks</b></p> <p>Concerning the claim that few studies examine how night lights and economic activity relate to each other in shock times, and that there is relatively poor understanding of what changes in night light intensity reflect exactly especially when downturns are considered (pp. 2):</p> <p>"I (partially) respectfully disagree with this sentence. Please check here: <a href="https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1002/2014GL061859">https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1002/2014GL061859</a>. This was, to my personal knowledge, the first application of NTLs in hydrological studies (where hydrological extremes, such as floods, are considered). Therein, NTLs were linked to economic and human losses associated to flood events at the global scale, yet not focusing on the short-term scale. Therefore, I would suggest slightly revising/updating this first introductory paragraph."</p>	<ul style="list-style-type: none"> <li>• We thank the referee for pointing us to this paper. The authors show that NTLs along river networks can be used as a reasonable proxy for flood exposure. Using country-level flood loss data (from EM-DAT), the authors show a positive correlation between light intensity along river networks and normalized flood damages (per km<sup>2</sup>, based on country-level aggregates). The link between flood exposure and night lights is therefore evident. However, this paper, like many others, provides no guidance as to how local variability of night light intensity may reflect the occurrence of such flood events at their respective locations. This is especially relevant w.r.t. downturns, which – as the authors also indicate in their paper – is less common than growth or stagnation.</li> <li>• We have updated the literature list to include a reference to the mentioned study as it is relevant to our literature discussion.</li> </ul>
<p>"I really appreciate your final goal, but how would you operate in less-developed areas, where NTL values are smaller compared to</p>	<ul style="list-style-type: none"> <li>• We appreciate this comment, as in part it points to the value of our work in areas with less reliable socio-economic data.</li> </ul>

<p>developed regions? How would you manage different study areas, with completely different socio-economic characteristics? Please elaborate more on this, maybe in the discussion.”</p>	<p>However, we also acknowledge that further research is required to evaluate the relation we explore in our paper in a less-developed context. Promising avenues for this could be countries with lower income per capita, but high flood risk, that do provide these data. Indonesia would be an example.</p> <ul style="list-style-type: none"> <li>• However, while we do not claim external validity of our results in other parts of the world, for our results not to hold the relation between changes in night light and changes in economic activity would have to be of a different nature, at least in times of natural disasters. While this could be true, this hypothesis really does need empirical testing.</li> <li>• We will update this in our discussion section and will suggest directions for future research.</li> <li>• We also acknowledge that night light data may be less useful in areas that are sparsely populated and/or very dimly lit. This has been pointed to for example by Chen and Nordhaus (Journal of Economic Geography, 2015). We propose to include a brief discussion on this in the discussion/conclusion.</li> </ul>
<p>“Figure 1 (pp. 5) is not necessary in my opinion, since it is also shown as panel a in Figure 2”.</p>	<ul style="list-style-type: none"> <li>• We tend to agree; this information could be condensed in what is now Figure 2.</li> </ul>
<p>Question about employment growth in different sectors (pp. 5): “This part is not clear to me. Would you please elaborate more on this?”</p>	<ul style="list-style-type: none"> <li>• The confusion may have been caused simply by the phrasing. Our point is that services-oriented sectors experienced a severe decline as a consequence of the shock from Katrina. While the construction sector experienced some employment growth (roughly 7 percent), all other sectors experienced losses between 10 to 20% of employment. The net employment loss was large.</li> <li>• We will clarify this in-text to resolve any ambiguity here.</li> </ul>
<p>Comment on the need for a map of the 8 counties which form the focus of the analysis (pp. 7): “A map showing the geographical locations of these counties is needed (maybe revise Figure 1, which is simply a copy and paste from DFO – also check the copyright.”</p>	<ul style="list-style-type: none"> <li>• We would like to stress that in Figures 3 through 7 the counties are projected clearly on each map.</li> <li>• Our suggestion is to revise Figure 5 such that it projects more clearly the 8 counties that form the focus of our analysis. This could be done by highlighting their borders, relative to the other counties reported on these maps.</li> <li>• We were under the impression that the copyright of the DFO map is secured under a Creative Commons license. However, the current information on the DFO portal suggests differently. We have requested permission to use (part of) the flood map in this academic publication, but have not received an answer as of yet (13<sup>th</sup> of May 2022). We propose to either secure permission to use the figure, or to prepare a different flood map to replace Figure 1 and the top left panel of Figure 2.</li> </ul>
<p>Comment on Figure 2 (pp. 8): “I would recommend showing corrected NTLs.”</p>	<ul style="list-style-type: none"> <li>• We have deliberately displayed uncorrected NTLs here to show that regardless of correction methods, the clear drop in NTL intensity is visible in the affected area. We believe this to be a powerful message, and it clarifies the starting point of our analysis before getting into discussions on how the temporal corrections on the night lights should be performed.</li> <li>• In Figures 6 and 7, which also focus on changes in light intensity, we apply the corrected NTL data and show that the pattern holds.</li> </ul>
<p>Comment on the indexation of NTL in Figure 4 (pp. 10): “This computational step is not explained in detail in the text. I would strongly suggest you to add this part. Also, in Figure 8, a value of 1 is used rather than 100. Please select a uniform value.”</p>	<ul style="list-style-type: none"> <li>• We will clarify the indexation in the main text. Furthermore, we hope to have clarified this approach in our reply to the first major comment on the correlation analysis.</li> <li>• We thank the referee for pointing out the mixed use of 1 and 100 as our base for the index. We will of course adjust this to have one value only (100).</li> </ul>
<p>Comment on Figure 6 (pp. 12): “Did you find any increment in NTLs? Also, since in the text you are citing several cities, these names should be added to Figures for a better understanding.”</p>	<ul style="list-style-type: none"> <li>• We hope to understand the first part of this comment correctly: does the referee mean whether we have also found increases in NTL intensity? If so, the answer is yes – albeit only for those locations that were not top-coded prior to Katrina. Increases in NTL intensity have been masked in this figure to focus on decline only.</li> <li>• We acknowledge the request to add city names to the Figures, although they may clog the figures with more names (as of yet, the county names are included and nothing else). Also, the cities could be added as polygons or as points. For clarity, we would suggest using points then.</li> </ul>

<p>Comment on Figure 7 (pp 12): “It would be interesting to see the difference between 2005 (Katrina’s year) and 2006, to identify and locate areas already recovered.”</p>	<ul style="list-style-type: none"> <li>• Strictly speaking this suggestion implies showing a figure with the difference in pixels values between Figure 6 and Figure 7. However, by placing these figures on one page, we feel that this difference can be observed reasonably well by comparing the figures.</li> <li>• Moreover, the difference between 2005 and 2006 crucially depends on the drop in light experienced between 2004 and 2005. First, this implies that changes between 2005 and 2006 should be interpreted conditional on the change in the previous year, which we believe to be hard to communicate in a single figure. It could be achieved by indexing light values to 2004 in the map, but this results in a new (visual) problem: because of the wide range of pixel values, indexed values may represent small absolute changes at low initial light intensity equally with larger absolute changes at higher levels of initial light intensity. This quickly turns into comparing apples with oranges. We therefore chose to depict the changes in the maps in absolute terms, and relative to the base year 2004.</li> <li>• After aggregating light intensity to the county level, as we do in the remainder of the analysis, these issues no longer play a role.</li> </ul>
<p>Comment on Figure 8 (pp. 15): “While I am in favour of checking the relative difference in NTLs between 2005 and 2004 and in population between 2006 and 2005, the identification of 3 groups looks a bit speculative, especially for Harrison, Jackson and Jefferson, whose variability in time is negligible. Also, NTLs are known to be a proxy for population and GDP, yet they do not represent exactly these variables. For these reasons, it is not possible to observe similar changing rates, but it is more reliable of observing similar directions of change. As a consequence, the whole discussion of results should be smoothed out.”</p>	<ul style="list-style-type: none"> <li>• We thank the referee for pointing out that we may have ventured into too much detail explaining the results variable-by-variable and county-by-county. We feel that it is imperative to make the point that the patterns in direction of change are similar, but that there is substantial heterogeneity in impacts of Katrina on economic activity from county to county. We acknowledge that a focus on similar rates of change may be unnecessary and will adjust the discussion accordingly.</li> <li>• We suggest to indeed smooth out and shorten this section considerably.</li> </ul>
<p>Comment on Figure 8 (pp. 15): “Is this an error? Before you stated that results shown here refer to Elvidge calibration method. Please check.”</p>	<ul style="list-style-type: none"> <li>• This is indeed an error and we have rectified this. The note now correctly reads: “Night lights are calibrated using the Elvidge et al. (2014) method.” We thank the referee for noticing this typo.</li> </ul>