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Discussions

Interactive comment on "The Lumen Gini Coefficient: a satellite imagery derived human development index" *by* C. D. Elvidge et al.

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This manuscript proposes leveraging widely (in both spatial and temporal terms) available nighttime lights data to develop an index that can be calculated at multiple geographic scales to assess either development or the distribution of wealth. The premise of the paper is promising: often the necessary data for understanding income distribution or wellbeing within a country is nonexistent or of poor quality and there is high demand for better understanding of the variation and evolution of inequality around the world. The authors appear to have a commanding understanding of the nighttime lights data but their articulation of the connection between the Gini Coefficient and their "Lumen Gini Coefficient" is imperfect.

Mainly, I think the existing manuscript could be improved by significantly expanding the

narrative to more thoroughly explain what the analysis is showing. The laundry list of correlations in the Results section may very well contain some important pieces of information, but without explaining what – for example – the Ecological Footprints index captures, it is difficult to interpret that result. An improved manuscript might take each correlation in turn and interpret the findings. Equally importantly, it would be helpful if the introductory section could expand on the brief interpretations given for Figures 1, 2, and 3, since this is the jumping off point for the analysis. Clear examples are always helpful to readers who may not be comfortable interpreting unfamiliar measurements and figures.

I am by no means an expert on income inequality or the Gini Coefficient, but one thing that struck me when reading this manuscript was that the typical Gini Coefficient is actually aspatial in the sense that it's measuring distribution of income across society/segments of population, rather than geographic sub-units. Your measurement, if properly conceptualized and explained, holds the potential to say something about the distribution of income (as measured by lights) relative to population distribution across spatial units – similar to the Hoover Index of Population Concentration. At any rate, I think it's important to think about what the Lumen Gini is actually capturing and then link those findings to existing literature.

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