

Earth Syst. Sci. Data Discuss., author comment AC1
<https://doi.org/10.5194/essd-2021-10-AC1>, 2021
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Reply on RC1

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Author comment on "Spatially explicit global gross cell product (GCP) data set consistent with the Shared Socioeconomic Pathways" by Tingting Wang and Fubao Sun, Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2021-10-AC1>, 2021

Thank you for all the helpful comments that improved our manuscript. We have reproduced this GDP data set and almost rewritten the whole manuscript. The changes being made are marked in revised version in the manuscript.

First, the novelty of this data set has been stressed across the manuscript, and a detailed description of SSP has been provided in section 2.4.

The structure has been largely improved, and we put more attention on the transition between paragraphs. In detail, the descriptions of 4 gridded population data sets except the LandScan population data set, and their evaluations on population estimation at various spatial scales have been moved to supporting online material. Other irrelevant material has been removed from this manuscript. On the other hand, we added several sections, including evaluation of different approaches in GDP disaggregation in section 3.4 and a more detailed description on GDP and GRP in section 2.3. The discussion has been largely improved as well. Please see the revised manuscript and we won't elaborate here.

The novelty of newly reproduced GCP data set lies in the superiority of methodology of LitPop approach, and the official GRP (394 OECD large (TL2) regions from 36 countries, and over 5000 counties in USA and China) figures used in GCP production at a high spatial resolution of 1km, which can further improve the accuracy of GCP data set. The improved version of LitPop approach, which combines NTL images and LandScan population in GDP disaggregation, helps reduce the shortages of saturation problem in NTL images and the precondition of even GDP per capita within an administrative boundary in gridded population data set when using either alone. The evaluation in section 3.4 further proves the superiority in higher accuracy in GDP disaggregation at a smaller scale. The limitation of LitPop approach has been discussed in section 6.

Besides, we have corrected some mistakes (incorrect GDP and GRP figures) and reproduced this GCP data set.

Other minor mistakes, e.g., full name of "ScenarioMIP" in the abstract, grammar mistakes as mentioned, have been corrected.

Last but not least, thank you again for all the help in improving our manuscript.