Response to reviewer comments

We thank the reviewer for the precious and constructive suggestions to improve our manuscript. Please find our point-by-point response below.

Reviewer 3:

This work reconstructed a historical, annual N fertilizers use dataset in China at 5 km × 5 km resolution covering the period of 1952 to 2018 by integrating improved cropland maps. The dataset is useful for many purposes. Generally the paper is well-written, I have several concerns for authors to improve it before accepting for pubilication.

Response: We thank the reviewer for valuing our work! We have addressed all the concerns raised by the reviewer.

1) The Figure 1. Methodology flowchart of nitrogen (N) fertilizer map reconstruction is not detailed enough to illustrate the methods used. Need to be improved by inclsuign the major methods used.

Response: We thank the reviewer for the suggestion. We agree and revised the methodology flowchart to help clear the methods used. Specifically, we added the temporal coverage of the data, the details of the processes, and the methods implemented. Please check our new flowchart below:

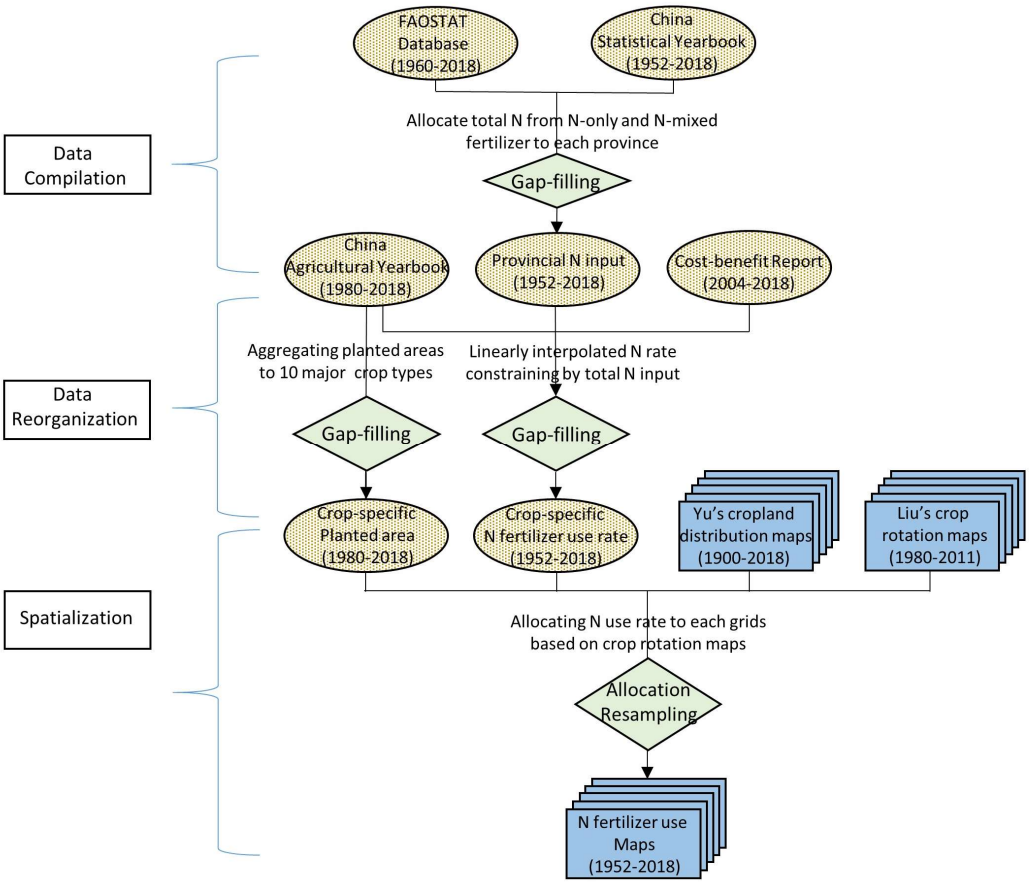

Figure 1. Methodology flowchart of nitrogen (N) fertilizer map reconstruction

2) Are the spatial pattern of N fertilizers use in each of the major crop types planted in China available? Why not resported in the main text? Are the data are availbale?

Response: We thank the reviewer for this precious suggestion. We have calculated the N fertilizer use in each of the major crop types in China. These data will be released together with the original N input product during the next step of manuscript reviewing process. Also, discussion about this information will be added in the main text. Here is an example showing the spatial distributions of N fertilizer use rate by crop types in China in 2018 (note the panel h indicate the N fertilizer use rate of double crops):

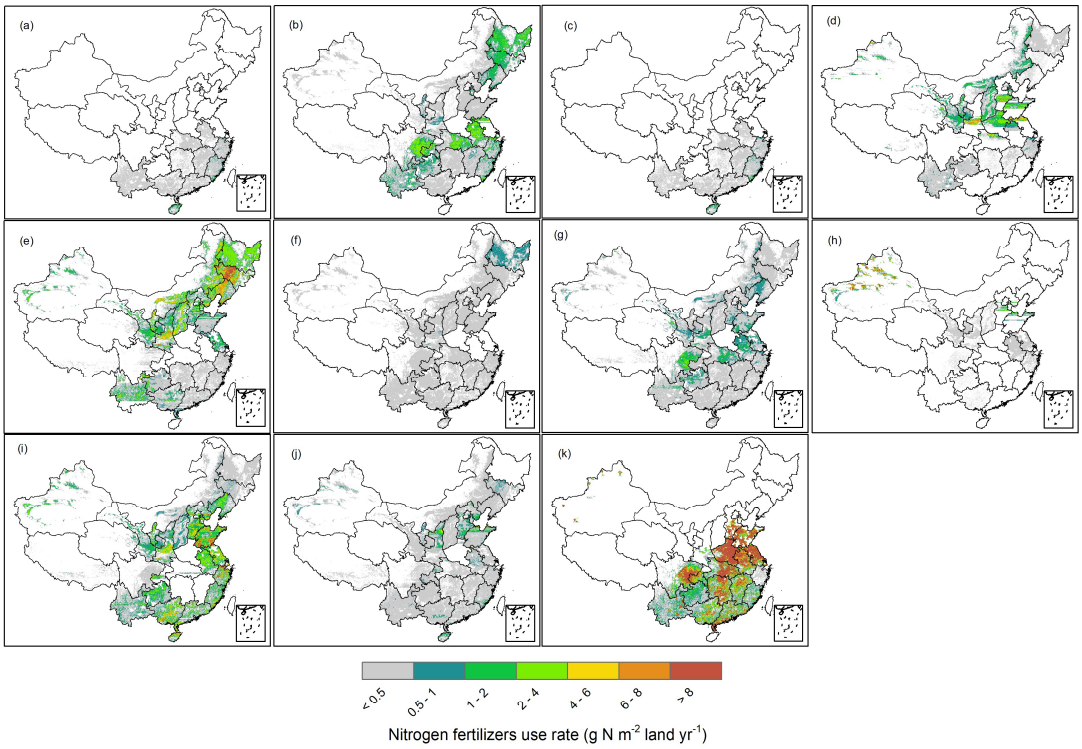

Figure. Spatial distribution of nitrogen fertilizer use rate by crop species (panels a-h indicate the fertilizer use rate in early rice, mid-season rice, late rice, wheat, corn, soybean, oil seeds, cotton, vegetable, other crops, and double crops, respectively; the value in the scale bar indicates the N fertilizers use rate per square meter of land)

3) It is good that the authors compare the datasets wiith previous datasets. It is ture that the newly constrcued datasets are different but may need evidence that this data is more robust.

Response: We thank the reviewer for the suggestion. We have added the comparisons of the N fertilizer input at provincial derived from different studies (see figure below). Generally, we found that our maps (red color) perform better than the existing data products (blue color) in depicting the nitrogen fertilizer use in China. We believe these comparisons help evidence the quality of our data.

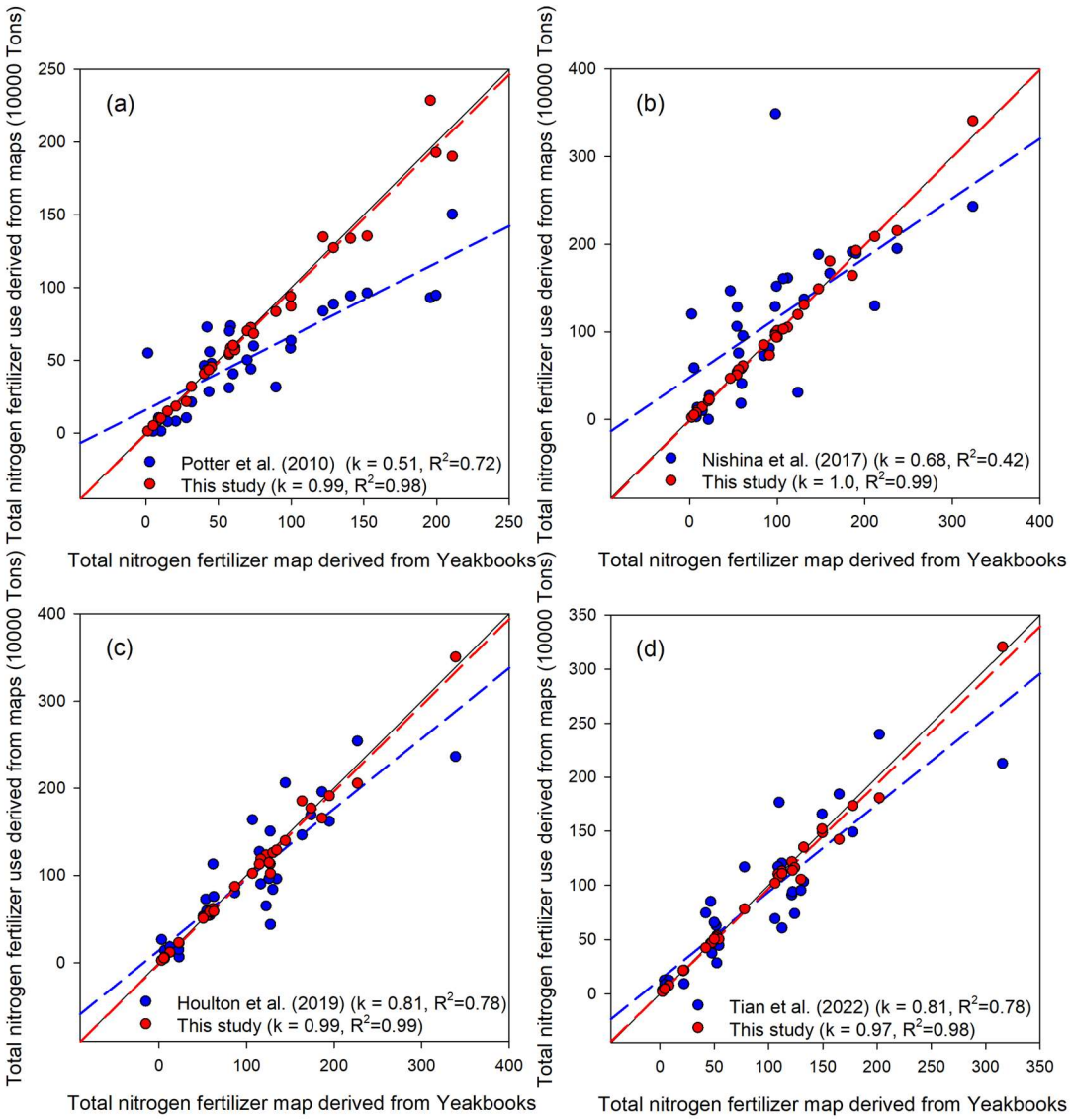

Figure. Comparisons of the total nitrogen fertilizer input in each province in China derived from different nitrogen fertilizer data products (the x-axis indicate the nitrogen fertilizer use obtained from the Chinese statistical yearbook; the black line indicate 1:1 line, and the red and blue lines indicate the linear regressions of the provincial nitrogen fertilizer input derive from this study and other studies; panels a-d show comparisons in the period/years of 1994-2001, 2010, 2015, and 2018, respectively; data of other studies were derived from the nitrogen fertilizer maps of Potter et al. (2010), Nishina et al. (2017), Houlton et al. (2019) , and Tian et al (2022), respectively)