

## ***Interactive comment on “Production and application of manure nitrogen and phosphorus in the United States since 1860” by Zihao Bian et al.***

### **Anonymous Referee #1**

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The manuscript “Production and application of manure nitrogen and phosphorus in the United States since 1860” developed datasets of annual animal manure N and P production and application in the U.S. continuously at a 30 arc-second resolution over the period of 1860-2017. In general, the manuscript is well written. However, this study should pay more attention to quantitatively describing regional livestock manure nutrients status (surplus or deficit ) on the basis of manure production and application, which is of vital importance for regional nutrient management of U.S. I cannot recommend for publication in this prestigious journal because the innovation of this manuscript is not as strong. The following issues should be properly addressed. Abstract: The first two sentences are too long. It needs to be brief and clear enough to support the objective of the study. It should be rewritten concisely to define the aim of the study.

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Introduction: The author should better indicate the scientific hypothesis and specific objectives of this study one by one in the last paragraph of Introduction. Methods: “We assumed that spatial pattern of livestock distribution inside each county were static over the study period” in row 126, “we assumed manure production changes in the U.S. were consistent with the global trend and manure N:P ratio was constant during 1860-1930” in row 146, “we assumed these variables or parameters did not change before or after the data-available period.” in row 195. Related references should be provided. Results: Statistical analysis should be described in more details in this section. Any detailed regional data to make comparison possible? The first sentence of “3.1 temporal and spatial patterns of manure nutrient production”( in row 202), the author calculated the average total manure N and P production during 1860-2017. What’s the meaning of this data in such a large time scale. Similar to the row 234 (the average annual manure N and P application in the U.S.). In row 204, please rewrite the sentence “Compared with production rates in 1860 (1.4 Tg N yr<sup>-1</sup> and 0.3 Tg P yr<sup>-1</sup> 204 ), manure N and P production in 2017 increased 5-fold and 7-fold at a rate of 0.04 Tg N yr<sup>-1</sup> and 0.01 Tg P yr<sup>-1</sup> 205 , respectively”. It’s better to note that 1.4 Tg N yr<sup>-1</sup> and 0.3 Tg P yr<sup>-1</sup> is manure N and P production. The reason why the author chose the year of 1860, 1930, 1980, and 2017 for analysis should be specified in the manuscript. In row 238, “total manure P application reached 2.3 Tg P yr<sup>-1</sup> in 2017”, please recheck the value of 2.3 Tg P yr<sup>-1</sup> which does not match Fig.5. Discussion: In “4.1 Comparison with previous investigations”, the authors have compared the results with four previous studies. So how to quantitatively describe the discrepancies caused by different coefficients or statistical methods? Data availability: Since the author have cited the data resource in Methods, this part can be moved to Methods. Using words/phrases: The language of this manuscript should be re-polished.

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