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Interactive comment on "Estimating global surface ammonia concentrations inferred from satellite retrievals" *by* Lei Liu et al.

Anonymous Referee #1

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This manuscript estimated global surface NH3 concentration based on satellite retrievals and the tempeoral variation of NH3 concentation was also presented. The study was well designed and the results are also important for evaluate NH3 pollution in the world. The major comments to the manuscript are as follows.

1 Lines 278-280, for comparing the satellite-derived and measured surface NH3 concentrations, are there any criterions to choose the sites whith measured surface NH3 concentrations? This is because satellite-derived surface NH3 concentration in a grid (0.25° latitude × 0.25° longitude) is a reflection of the averaged NH3 concentration in this grid area, but the NH3 concentration measured at a site may only represent a limited area. For a grid with diffrent sources of NH3 (e.g., cropland, animal house or feedlot), the NH3 concentration in this grid may have large spatial heterogeneity, then

how to find a site with the surface NH3 concentration to represent a grid area?

2 Lines 282-284, for comaparing NH3 concentrations with different methods, the information on how many measuring sites, and where the sites located should be given for each country or region.

3 Lines 284-286, as mentioned in comment 1, the spatial heterogeneity of NH3 concentration in a grid and the measuring sites location may also cause the differences between satellite-derived and ground-based NH3 concentration. Thus, this discussion should be added here. Besides, the detection limit and precision for deriving NH3 concentraion using the satellite should be given.

4 Lines 318-320, More details of the location of NH3 hotspots should be given. In China, where is the eastern China? It seems that there were also NH3 hotspots in Shannxi,Shanxi, Gusu and Hubei provinces, and there were no hotspot (> 8 ug N m-3)in Xinjiang province in Fig. 4?

5. Lines 321-324, in fact, more than half the NH3 emissions in China is caused by animal production. The higher NH3 concentration in eastern China can also be caused by animal production. More discussion and supporting data should be provided to strenthen the contribution of animal production on NH3 concentration. This is also true for US and Europe.

6. Lines 398-402, are there any differences for the seasonal variation of NH3 concentration in different regions in the world?

7. Lines 486- 488, which sector (crop or animal production) did cause the increase of NH3 emissions in China in 2008-2015?