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Interactive comment on "A comprehensive biomass burning emission inventory with high spatial and temporal resolution in China" *by* Ying Zhou et al.

Anonymous Referee #1

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"general comments" In general, this study quantified a comprehensive biomass burning emissions including indoor and outdoor biomass burning emissions and fits the requirement of East Asia emissions assessment. However, it is difficult to find anything new to the scientific world. Since there is nothing new on used methods or data. And some methods and data usually reduce some errors and uncertainties.

"specific comments" The biomass burning includes firewood burning and in-field burning. There is another large contributor of human waste burning that should not be overlooked, especially in rural area of the developing countries. Since this is a comprehensive inventory, I suggested the authors can add this part. Wiedinmyer, C.; Yokelson, R. J.; Gullett, B. K.Global emissions of trace gases, particulate matter, and hazardous

air pollutants from open burning of domestic waste Environ. Sci. Technol. 2014, 48 (16) 9523–9530, DOI: 10.1021/es502250z Shi, Y., Matsunaga, T., and Yamaguchi, Y., High-resolution mapping of biomass burning emissions in three tropical regions, Environmental Science and Technology, Environ. Sci. Technol., 2015, 49 (18), pp 10806–10814. DOI: 10.1021/acs.est.5b01598

2.2.3 Biomass burning of forest/grassland fires The estimation of burned biomass in this very simple method have lots of problems. AR is the damaged area, in fact, it is the burned area, they are far different. Burned area data were usually derived from satellite data for such a large area of China. It is basically wrong that the authors used the statistics data to allocate them according to the fire counts. Since fire counts does not linearly correspond with the burned area. Please refer to MCD64A1 burned area product with 500 m resolution, which has been validated in many ecosystems. Fire consumes great amount of biomass when burning happens. And this biomass usually cost several years to recover to its previous condition. The authors failed in considering the reduction of biomass of this month due to fire as the beginning of the next month. Therefore, I suggested the authors should consider the reduction of biomass when it is used as the base for the next month. Besides, the biomass used in this study within each province are even. The biomass density was constrained by precipitation, air temperature and vapor pressure controlled gross primary production, respiration, etc. The used constant data cannot reflect the heterogeneity of the biomass. Combustion factor is strongly controlled by fuel types and moisture conditions and vary widely from pixel to pixel. The authors set the combustion factors for each fuel type as constant, which cannot depict the differences between moisture and dry fuels types. Since dry fuels can burn mostly while wet fuels burn less completely. I suggested the authors should consider the moisture condition of the fuel types and revised them into spatial and temporal variable parameters, which can really reflect the condition of each pixel. Since there are many available satellite products on burned area, ecosystem productivity model estimated biomass density and moisture condition, we really do not suggest the authors used the county-level data and allocate them into each pixel. The estimation of biomass burning emissions by using the bottom-up method should use the pixel-based high-resolution datasets to describe its process. van der Werf, G. R., Randerson, J. T., Giglio, L., Collatz, G. J., Mu, M., Kasibhatla, P. S., Morton, D. C., DeFries, R. S., Jin, Y., and van Leeuwen, T. T.: Global fire emissions and the contribution of deforestation, savanna, forest, agricultural, and peat fires (1997–2009), Atmos. Chem. Phys., 10, 11707-11735, doi:10.5194/acp-10-11707-2010, 2010.

As for 2012, this study estimated 665.989Tg CO_2 list in Table 7 and there is almost no forest and grassland fires based on Figure 2 CO_2 chart and Figure 8 CO_2 chart. But actually, by using the ecosystem production model integrated with fire emission process, Global Fire Emissions Database v4 (GFED4) estimated outdoor biomass burning emissions (forest, savanna and agriculture) with 54 Tg CO_2 in 2012. Authors should explain this large differences due to their used methods and datasets.

Figure 7: In North China Plain, there are many polygons in blue with small amounts of $PM_{2.5}$, which were far lower than their surrounding areas, the sudden reduction of these polygon values may be attributable to the used county-level data, we suggested the authors changed this dataset since it is unreasonable of these polygons with small amount.

Figure 10: This study estimates SO_2, NO_x, which are comparable to Lu et al., (2011). What is the reason for the underestimation of PM_{10}, VOC, NH_3, CH_4 and overestimation of EC and OC relative to Lu et al.,(2011). Why these emissions agreed well in NO_x, but large differences on other gases?

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