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Interactive comment on "Spatial distribution of aerosol microphysical and optical properties and direct radiative effect from the China Aerosol Remote Sensing Network" *by* Huizheng Che et al.

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Che et al. "Spatial distribution of aerosol microphysical and optical properties and direct radiative effect from the China Aerosol Remote Sensing Network"

This study takes the advantage of the multi-band original observation data of the sun-photometer for many years from the China Aerosol Remote Sensing Network, and applies ground inversion method to calculate the atmospheric aerosols optical characteristic parameters. The authors sorted and processed the data results in aerosol optical properties in China. The results of this study established a ground aerosol remote sensing optical parameters dataset which is more complete, accurate and reliable in China. This work will help to improve China's climate change research and even for

the East Asia. This research enhanced the understanding of aerosol optical properties in different regions of China. I would suggests its publication after minor revision.

Detailed comments Lines 67-69. It is well known that the aerosol-cloud interaction plays very important roles to the radiation balance and remains as the largest uncertainty in climate model prediction, even more important than the aerosol direct radiative effect. Before diving into aerosol direct effect, one or two sentences of description about the aerosol indirect effects might be necessary. For example, Garrett and Zhao (2006, DOI: 10.1038/nature04636) and Zhao and Garrett (2015, doi:10.1002/2014GL062015) have shown the warming effect in longwave radiation by aerosol indirect effect in the Arctic, Xie et al. (2013, 10.1175/JCLI-D-12-00517.1) show the cooling effect of aerosol indirect effect. For aerosol direct radiative effect, Yang et al. (2016, doi:10.1002/2016JD024938) particularly indicate (also) the optical properties of aerosols determine the particle direct radiation effect. Lines 69-75, In addition to the climate impacts, aerosols also play important impacts on weather. For example, Zhao et al. (2018, doi: 10.1029/2018GL079427) showed that aerosol can enlarge the rainfall area of tropical cyclone, causing severe flooding damage. Lines 73-75, Zheng et al. (2017, doi: 10.5194/acp-17-13473-2017) have done a comprehensive study about the aerosols based on AOD, size, angstrom exponent, PM2.5, and so on, which is worthy to mention here. Lines 75-76, This is true. Actually, aerosol direct radiative effect can also be used to derive the absorptivity of aerosols. Some recent references might be worthy to be cited. Lines 98-100, I would suggest changing "due to" to "associated with", since I do not think the economy development is the direct reason for aerosol emissions. Moreover, a few more citation could be added here, such as Yang et al. (2018, DOI: 10.1016/j.atmosres.2018.04.029), Zhao et al. (2019, doi: 10.1029/2018JD028888), Yang et al. (2019, DOI: 10.1016/j.atmosres.2019.01.027), and Li et al. (2016, doi:10.1002/2015RG000500). Line 103, "pay" -> "paid" Line 103-106, There are also studies about the effect of aerosol optical properties on the sea-land breeze by changing the surface radiation, such as Shen et al. (2019, doi: 10.1016/j.atmosres.2019.05.007). Line 107-109, "conducted" -> "were conducted",

and some more recent studies should be cited, such as Zhang et al. (2019, doi: 10.1007/s13143-019-00125-w), and Yang et al. (2019, doi: 10.1029/2019EA000574). Lines 109-112, I think the aerosol optical properties should be studied over much more locations than that listed here, you may use “et al.” or other words to be more accurate. For example, Zhao et al. (2018, doi: 10.1007/s00376-017-7069-3) have studied the aerosol properties over Xianghe, Hebei province. Lines 126-128, I think the purpose of these aerosol properties measured are not only for evaluation of aerosol first indirect effect. We may change the description as “... can at least be used ...” Lines 135-136, “can be provided” Line 151, delete “multi-year” since there is already “from 2010 to 2017”. Line 157, there are two “five sites”, please delete one to avoid redundant. Lines 169-171, “There are several ... that have been used at the 50 sites in this network as follows”

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