Atmos. Chem. Phys. Discuss., 11, C480–C485, 2011
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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Analysis on the impact of aerosol optical depth on surface solar radiation in the Shanghai megacity, China" *by* J. Xu et al.

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Firstly I want to pay our heartful appreciations to the referee for the meaningful comments on this article. We will benefit a lot from the suggestions to improve our studies. Following is our replies according to the comments: (1) As is mentioned by the referee, AOD can be retrieved by MODIS even under cloudy skies provided that there is no cloud in the satellite passage. This phenomenon has been paid much attention during the analysis procedure. We used hourly observation of cloud fraction during 09:00-10:00 LT and 13:00-14:00 LT by experienced observers in the pyranometer site to determine if the AOD was applicable for the clear-sky analysis. Only those AOD data meeting the condition that the cloud fraction was less than 0.1 during the satellite passage interval were collected for the statistics in this study, which guarantee that

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the AOD data satisfied the clear-sky conditions. (2) I fully agree with the viewpoint of the referee about the difference between our study and previous works concerning the contribution of aerosol on SSR variations. This has been discussed in detail in Section 1, page 630 in the paper. Furthermore another important feature of our study was also pointed out in the same paragraph that hourly DiSR and DfSR data were combined with the AOD measurements to explore this issue. (3) Strictly speaking, the period between 1950s and 1980s is referred as “Global dimming”, and thereafter is mentioned as “brightening” (Wild, 2007). Above two stage of SSR variation is concluded based on the SSR data before 2000. Even that the trend of SSR is not thoroughly investigated after the new millennium in global, some new founds have been identified in recent studies, e.g., Xia [2010] suggested a renewing dimming of SSR in North China while a slight brightening in South China beyond 2000. In this paper, we also confirmed a renewed dimming of DiSR since the mid 1980s both in clear-sky and all-sky conditions. We do not tend to define a new terminology of “Re-dimming” in this paper, which used here only with the intention to separate it from the “dimming” period between the late 1960s to the mid 1980s. (4) The most difficulty for this work results from high resolution SSR measurements as well as cloud observations. If sufficient data are collected, we will continue the study in the future with highly intentions. (5) Solar radiation is the ultimate energy source for the Earth. Study on the characteristics of SSR variation in Shanghai megacity is helpful for better understanding of regional climate change in east china monsoon area. Two of the references recommended by the referee are referred in section 1 of this article, when mentioning the origin of dimming and brightening in the east china monsoon area. (6) Some minor errors in figures of the article have been corrected and presented as following. Supplement is the revised text version.

Please also note the supplement to this comment:
http://www.atmos-chem-phys-discuss.net/11/C480/2011/acpd-11-C480-2011-supplement.pdf

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Interactive comment on Atmos. Chem. Phys. Discuss., 11, 627, 2011.

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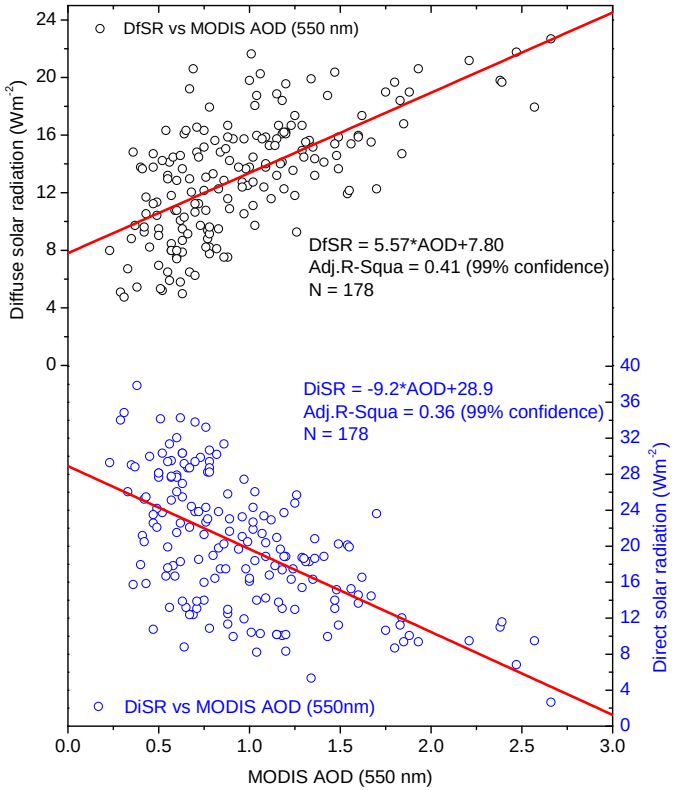

Fig. 1.

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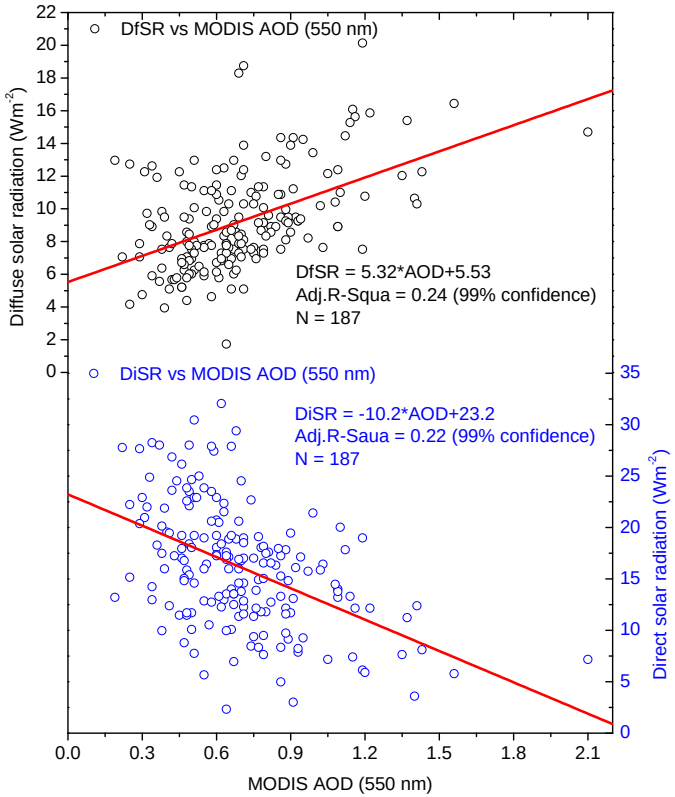

Fig. 2.

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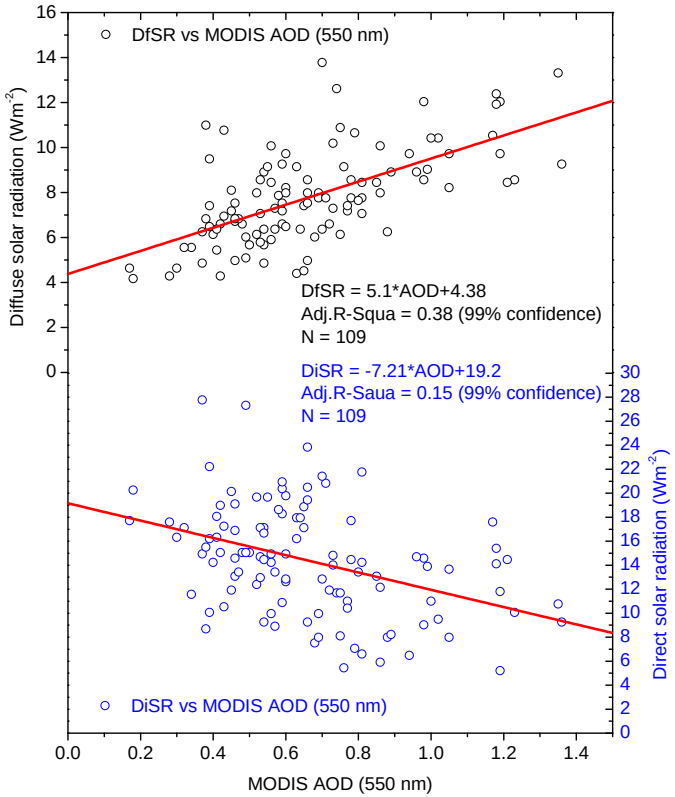

Fig. 3.

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